Draft Annual Report of Activities

June 5, 2009 to September 30, 2010

Delta Operations for Salmonids and Sturgeon (DOSS) Group

Interagency Technical Team

October 2010

Acronyms and Abbreviation

BiOp	Biological Opinion
CDFG	California Department of Fish & Game
CNFH	Coleman National Fish Hatchery
CPUE	catch per unit effort
CVP	Central Valley Project
CWT	coded wire tag
DAT	Data Analysis Team
DCC	Delta Cross Channel
DPS	Distinct Population Segment
DWR	California Department of Water Resources
EFH	Essential fish habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FWS	U.S. Fish & Wildlife Service
IEP	Interagency Ecological Program
JPE	Juvenile production estimate
KLCI	Knights Landing Catch Index
LFR	Late fall-run Chinook salmon
LSNFH	Livingston Stone National Fish Hatchery
NMFS	National Marine Fisheries Service
OMR	net tidal flow measurement in Old and Middle Rivers combined
RBDD	Red Bluff Diversion Dam
Reclamation	U.S. Bureau of Reclamation
RPA	Reasonable and Prudent Alternative
SCI	Sacramento Catch Index
SOG	Stanislaus Operations Group
SR	Spring-run Chinook salmon
SWG	Smelt Working Group
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	Thousand acre feet
TRO	temporary restraining order
USGS	U.S. Geological Survey
VAMP	Vernalis Adaptive Management Program
WOMT	Water Operations Management Team
WR	Winter-run Chinook salmon

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Chapter 1 – Background

1.1 Background

On June 4, 2009, the NMFS issued its Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project (CVP) and State Water Project (SWP; NMFS BiOp). The NMFS BiOp included the requirement that Reclamation create the Delta Operations for Salmon and Sturgeon (DOSS) Group. The DOSS group is a technical team that provides advice to NMFS and to the Water Operations Management Team (WOMT) on issues related to fisheries and water resources in the Delta, per the decision-making procedures outlined on pages 582-583 of the NMFS BiOp.

The purposes of the DOSS group are to

1) provide recommendations for real-time management of operations to WOMT and NMFS, consistent with implementation procedures provided in the Reasonable and Prudent Alternative (RPA) of the NMFS BiOp;

2) review annually project operations in the Delta and the collected data from the different ongoing monitoring programs;

3) track the implementation of Actions IV.1 through IV.4;

4) evaluate the effectiveness of Actions IV.1 through IV.4 in reducing mortality or impairment of essential behaviors of listed species in the Delta;

5) oversee implementation of the acoustic tag experiment for San Joaquin steelhead provided for in Action IV.2.2;

6) coordinate with the Smelt Working Group (SWG) to maximize benefits to all listed species; and

7) coordinate with the other technical teams identified in this RPA to ensure consistent implementation of the RPA.

1.2 Membership

The DOSS consists of representatives from Reclamation, FWS, NMFS, CDFG, DWR, SWRCB, and EPA.

U. S. Bureau of Reclamation (Reclamation)

Thuy Washburn

Josh Israel

U. S. Fish and Wildlife Service (FWS)

Nick Hindman

Roger Guinee

National Marine Fisheries Service (NMFS)

Bruce Oppenheim

Barb Byrne

California Department of Fish and Game (CDFG)

Dan Kratville

Carl Wilcox

Department of Water Resources (DWR)

Andy Chu

Mike Ford

State Water Resources Control Board (SWRCB)

Greg Wilson

Kari Kyler

U. S. Environmental Protection Agency (EPA)

Bruce Herbold

Chapter 2 – Summary of Discussions

The following agenda items were discussed in conference-call meetings from October 21, 2009, through September 21, 2010. Full meeting notes as well as NMFS determinations on Delta RPA actions are posted on the DOSS website: http://swr.nmfs.noaa.gov/ocap/doss.htm.

WEEKLY DISCUSSION TOPICS

- Water operations for the CVP and SWP
- Fish monitoring
- Updates from other technical teams (e.g. Smelt Working Group and Stanislaus Operations Group)
- Implementation of Delta RPA Actions (NMFS BiOp at pages 628-659):

  DCC Gate Operations -- Action IV.2.1 and Action IV.2.2 (NMFS BiOp at p. 633 and 635):
  These actions provide for monitoring and DCC operations necessary to reduce direct and indirect mortality of emigrating winter-run Chinook, spring-run Chinook, Central Valley steelhead, and green sturgeon.

  San Joaquin River Inflow to Export Ratio – Action IV.2.1 (NMFS BiOp at p. 641):
  During Phase 1 implementation of this action, Action IV.2.1 calls for management of Vernalis flow and combined exports according to the tables on p. 642 of the BiOp. In 2010, this action required Vernalis flows of at least 3000 cfs, and required that combined CVP/SWP exports not exceed 1500 cfs.

  Six-Year Acoustic Tag Experiment – Action IV.2.2 (NMFS BiOp at p. 645):
  This action calls for Reclamation and DWR to fund a 6-year research-oriented action that uses acoustically-tagged salmonids to assess the behavior and movement of outmigrating fish in the lower San Joaquin River. Per the exception on p. 647 of the NMFS BiOp, the VAMP study design was implemented in 2010.

  Old and Middle River Flow Management – Action IV.2.3 (NMFS BiOp at p. 648):
  This action calls for Reclamation and DWR to reduce exports, as necessary, to limit negative flows to be no more negative than -2500 cfs to -5000 cfs in Old and Middle Rivers, depending on the presence of salmonids.

  Reduce likelihood of entrainment or salvage at the Export Facilities – Action IV.3 (NMFS BiOp at p. 652):
  This action calls for Reclamation and DWR to reduce exports, as necessary, when certain fish loss densities are observed at the CVP and SWP salvage facilities from November through December.

  Actions within Action Suite IV.4 were not substantively discussed on the DOSS calls through September 2010.

OTHER DISCUSSION TOPICS: Occasional issues reviewed by DOSS during the 2010 water year

The following list of DOSS discussion topics highlights the substantive issues reviewed by DOSS over the past year. Minor or logistical discussion items are documented in the notes, but not listed here.

- DCC operations
- delays in getting real-time data
- other actions covered in the NMFS BiOp by DOSS
- annual reports
- Rio Vista Flow standard
- Delta Toolbox Workshop
- spring-run surrogate loss
- VAMP & San Joaquin Inflow to Export Ratio
- NMFS' RPA Action IV.2.3
- OMR salvage triggers
- SWP planned outage
- Water transfers requests to SWRCB
- Sturgeon research around Red Bluff Diversion Dam (RBDD)

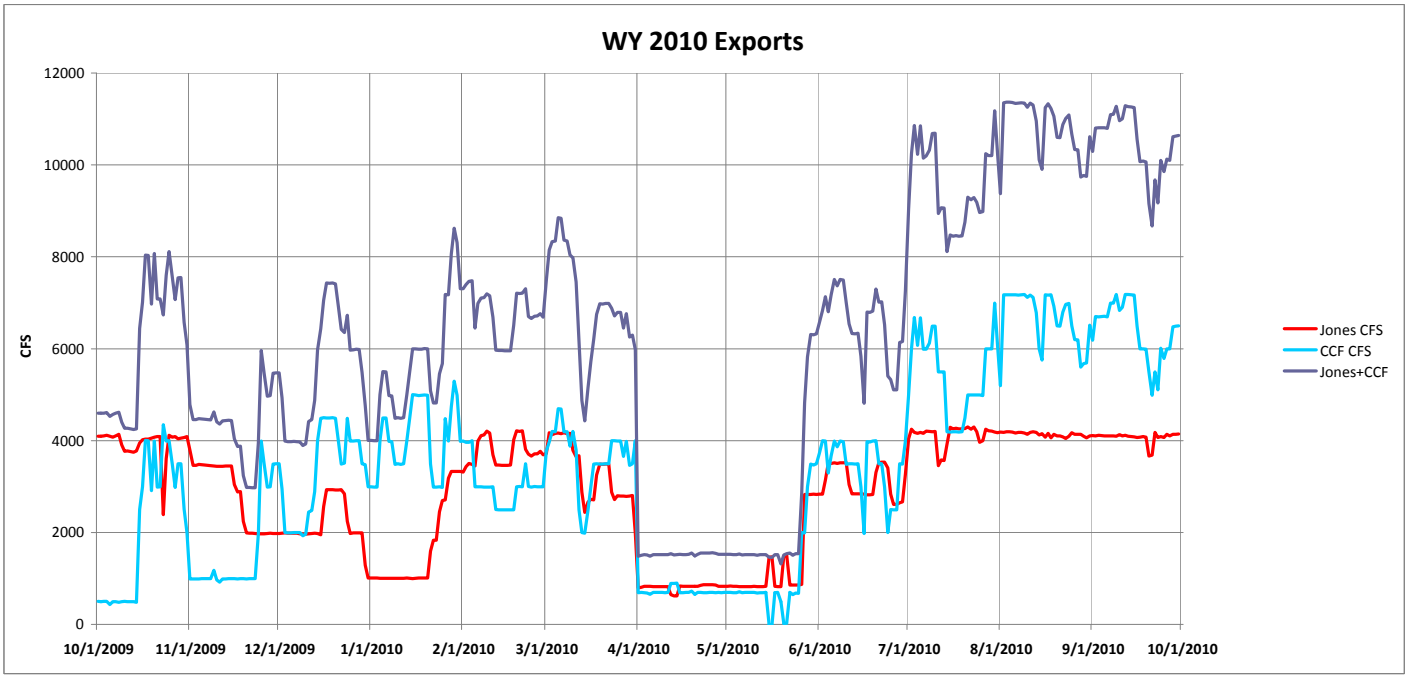
Chapter 3 – Water Operations Summary

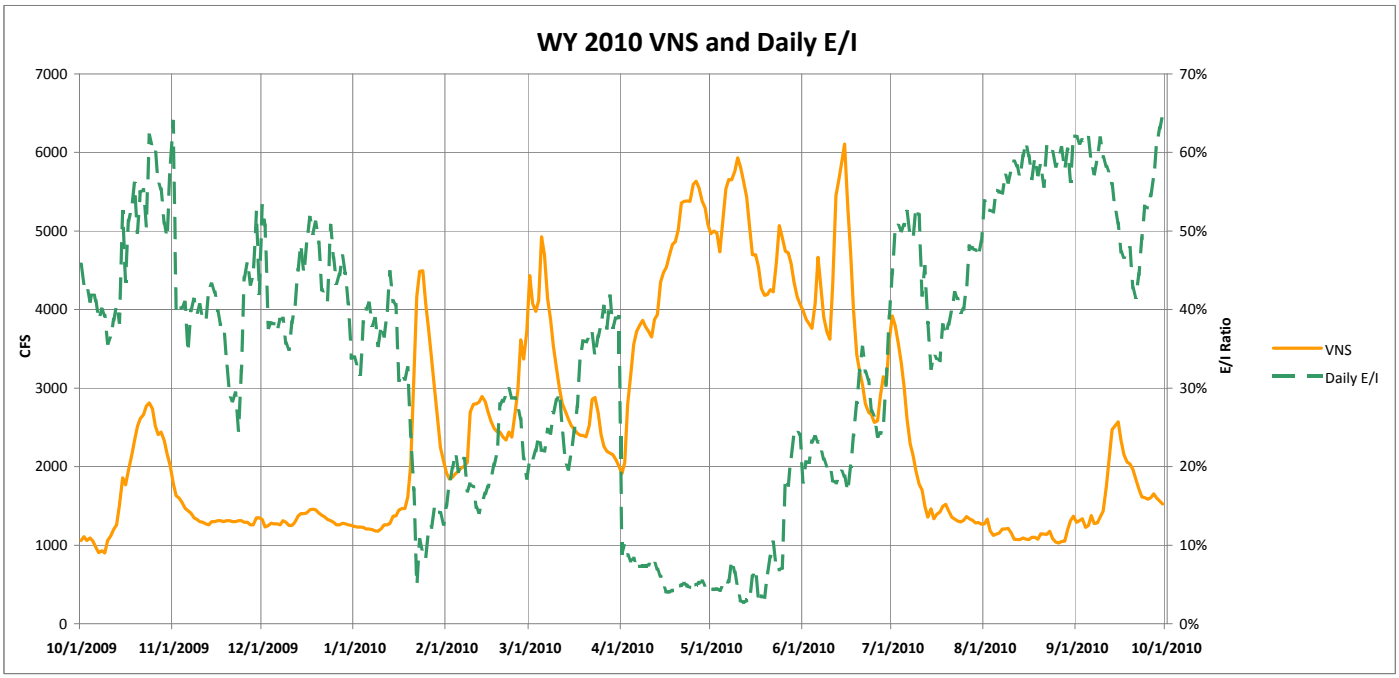
The two figures on the following page summarize, for the 2010 water year:

- Exports at the CVP and SWP
- Observed flows at Vernalis and the E:I ratio [the ratio of combined CVP and SWP exports (E) and delta inflow (I)]

Following the figures is a table summarizing additional aspects of CVP and SWP operations during the 2010 water year, including:

- Exports measured at the Jones Pumping Plant (CVP) and at Clifton Court (SWP)
- Position of the Delta Cross Channel (DCC) [Open (O) or Closed (C)]
- Observed net flows in Old and Middle Rivers (OMR)
- Factors controlling operations


WY 2010 Exports
CFS
12000
10000
8000
6000
4000
2000
0
10/1/2009
11/1/2009
12/1/2009
1/1/2010
2/1/2010
3/1/2010
4/1/2010
5/1/2010
6/1/2010
7/1/2010
8/1/2010
9/1/2010
10/1/2010
Jones CFS
CCF CFS
Jones+CCF


WY 2010 VNS and Daily E/I
CFS
E/I Ratio
7000
6000
5000
4000
3000
2000
1000
0
70%
60%
50%
40%
30%
20%
10%
0%
10/1/2009
11/1/2009
12/1/2009
1/1/2010
2/1/2010
3/1/2010
4/1/2010
5/1/2010
6/1/2010
7/1/2010
8/1/2010
9/1/2010
10/1/2010
VNS
Daily E/I

2010 CVP & SWP Operations & Delta Conditions *(DRAFT – subject to revision)*

Date	Balance Excess	Jones PP (cfs)	Clifton Court export (cfs)	DCC	DAILY OMR (cfs)	5 Day OMR Calculation (cfs)	14 Day OMR Calculation (cfs)	Controlling	Concern Standards
12/1/2009	B	1,981	3,493	O	-5551	-4384	-1945	NDOI/WQ	D1641 NDOI / WQ
12/2/2009	B	1,987	2,947	O	-5310	-4444	-2324		
12/3/2009	B	1,989	2,000	O	-3718	-4477	-2590		
12/4/2009	B	1,985	1,991	O	-2518	-4439	-2769		
12/5/2009	B	1,988	1,988	O	-3065	-4033	-2988		
12/6/2009	B	1,988	1,999	C	-3499	-3622	-3238		
12/7/2009	B	1,982	1,997	O	-3194	-3199	-3466		
12/8/2009	B	1,973	1,996	O	-2147	-2885	-3620		
12/9/2009	B	1,965	1,928	O	-1662	-2714	-3698		
12/10/2009	B	1,965	1,962	O	-2917	-2684	-3568		
12/11/2009	B	1,970	2,444	O	-4188	-2822	-3509		
12/12/2009	B	1,976	2,481	O	-4895	-3162	-3605		
12/13/2009	B	1,985	2,893	O	-4562	-3645	-3738		
12/14/2009	B	1,979	3,997	O	-3422	-3997	-3618		
12/15/2009	B	1,952	4,486	C	-4676	-4349	-3555	Salinity	D1641 Salinity Concern
12/16/2009	B	2,561	4,497	C	-5108	-4533	-3541		
12/17/2009	B	2,934	4,494	C	-5491	-4652	-3667		
12/18/2009	B	2,935	4,490	C	-5739	-4887	-3898		
12/19/2009	B	2,932	4,496	C	-5639	-5331	-4081		
12/20/2009	B	2,928	4,485	C	-5902	-5576	-4253		
12/21/2009	B	2,925	3,996	C	-6282	-5811	-4474		
12/22/2009	B	2,931	3,490	C	-4997	-5712	-4677		
12/23/2009	B	2,840	3,355	C	-3312	-5226	-4795		
12/24/2009	B	2,243	4,488	C	-4975	-5094	-4942		
12/25/2009	B	1,980	3,989	C	-5781	-5069	-5056		
12/26/2009	B	1,989	3,989	C	-6408	-5095	-5164		
12/27/2009	B	1,990	3,997	C	-5297	-5154	-5216		
12/28/2009	B	1,991	3,994	C	-4918	-5475	-5323		
12/29/2009	B	1,993	3,498	C	-4977	-5476	-5345		
12/30/2009	B	1,290	3,475	C	-4148	-5149	-5276		
12/31/2009	B	1,007	2,997	C	-2349	-4338	-5052		

2010 CVP & SWP Operations & Delta Conditions *(DRAFT – subject to revision)*

Date	Balance Excess	Jones PP (cfs)	Clifton Court export (cfs)	DCC	DAILY OMR (cfs)	5 Day OMR Calculation (cfs)	14 Day OMR Calculation (cfs)	Controlling	Concern Standards	
1/1/2010	B	1,009	2,994	C	-2765	-3831	-4839	Salinity	D1641 Salinity Concern	
1/2/2010	B	1,008	2,987	C	-2642	-3376	-4625			
1/3/2010	B	1,008	2,990	C	-2417	-2864	-4376			
1/4/2010	B	1,006	3,996	C	-3081	-2651	-4147			
1/5/2010	B	1,004	4,495	C	-3917	-2964	-4070			
1/6/2010	B	1,002	4,493	C	-3706	-3152	-4098			
1/7/2010	B	1,001	3,981	C	-4067	-3437	-4034			
1/8/2010	B	1,000	3,975	C	-4380	-3830	-3934			
1/9/2010	B	1,001	3,485	C	-4383	-4090	-3789			
1/10/2010	B	1,004	3,495	C	-4213	-4150	-3711			
1/11/2010	B	1,002	3,486	C	-3106	-4030	-3582			
1/12/2010	B	1,005	3,496	C	-4905	-4197	-3577			
1/13/2010	B	1,009	3,995	C	-4032	-4128	-3569			
1/14/2010	B	1,006	4,494	C	-2547	-3761	-3583			
1/15/2010	B	999	4,998	C	-3452	-3608	-3632	Fish screen		Fish Screen
1/16/2010	B	1,003	4,991	C	-5305	-4048	-3822	debris cleaning		
1/17/2010	B	1,007	4,980	C	-5094	-4086	-4013			
1/18/2010	B	1,007	4,984	C	-5712	-4422	-4201			
1/19/2010	B	1,011	4,995	C	-6089	-5130	-4356			
1/20/2010	E	1,013	4,986	C	-4513	-5342	-4414	OMR = -5000	OMR = -5000 Salmon BO	
1/21/2010	E	1,595	3,492	C	-4724	-5226	-4461	NMFS SALMON BO		
1/22/2010	E	1,831	2,990	C	-2702	-4748	-4341			
1/23/2010	E	1,832	2,987	C	-563	-3718	-4068			
1/24/2010	E	2,453	2,998	C	-1890	-2878	-3902			
1/25/2010	E	2,696	2,983	C	-3838	-2743	-3955			
1/26/2010	E	2,706	4,477	C	-4660	-2731	-3937			
1/27/2010	E	3,180	3,992	C	-4096	-3009	-3942			
1/28/2010	E	3,329	4,738	C	-4467	-3790	-4079			
1/29/2010	E	3,327	5,296	C	-5476	-4507	-4223			
1/30/2010	E	3,327	4,984	C	-6234	-4987	-4290			
1/31/2010	E	3,326	3,982	C	-5258	-5106	-4302			

2010 CVP & SWP Operations & Delta Conditions *(DRAFT – subject to revision)*

Date	Balance Excess	Jones PP (cfs)	Clifton Court export (cfs)	DCC	DAILY OMR (cfs)	5 Day OMR Calculation (cfs)	14 Day OMR Calculation (cfs)	Controlling	Concern Standards
2/1/2010	E	3,313	3,990	C	-4296	-5146	-4200	OMR = -5000	OMR = -5000 Salmon BO
2/2/2010	E	3,432	3,965	C	-4889	-5231	-4115	NMFS SALMON BO	
2/3/2010	E	3,505	3,963	C	-5424	-5220	-4180		
2/4/2010	E	3,484	3,998	C	-5590	-5091	-4242		
2/5/2010	E	3,449	2,998	C	-6599	-5360	-4520		
2/6/2010	E	3,993	2,992	C	-5353	-5571	-4862	TRO granted 2/6/10	TRO for 14 days for Salmon BO
2/7/2010	E	4,109	2,992	C	-5143	-5622	-5095		
2/8/2010	E	4,125	2,989	C	-4888	-5515	-5170		
2/9/2010	E	4,209	2,986	C	-5317	-5460	-5216		
2/10/2010	E	4,164	2,991	C	-4716	-5083	-5261	OMR = -4000	OMR = -4000 Smelt BO
2/11/2010	E	3,690	2,992	C	-4443	-4901	-5259	FWS SMELT BO	
2/12/2010	E	3,470	2,498	C	-3935	-4660	-5149		
2/13/2010	E	3,467	2,492	C	-3326	-4347	-4941		
2/14/2010	E	3,463	2,496	C	-3537	-3991	-4818		
2/15/2010	E	3,460	2,494	C	-3458	-3740	-4758		
2/16/2010	E	3,462	2,494	C	-3680	-3587	-4672		
2/17/2010	E	3,467	2,491	C	-3737	-3548	-4552		
2/18/2010	E	4,021	2,490	C	-4776	-3838	-4493		
2/19/2010	E	4,212	2,997	C	-5533	-4237	-4417	OMR = -5000	OMR = -5000 Salmon BO / OMR = -5000 Smelt BO
2/20/2010	E	4,202	2,999	C	-5768	-4699	-4447	FWS and NMFS BO	
2/21/2010	E	4,212	2,995	C	-5806	-5124	-4494		
2/22/2010	E	3,808	3,499	C	-5275	-5432	-4522		
2/23/2010	E	3,703	3,000	C	-4938	-5464	-4495		
2/24/2010	E	3,667	2,988	C	-5535	-5464	-4553		
2/25/2010	E	3,709	2,999	C	-4210	-5153	-4537		
2/26/2010	E	3,714	2,998	C	-4585	-4909	-4583		
2/27/2010	E	3,768	2,997	C	-4324	-4719	-4654		
2/28/2010	E	3,691	2,994	C	-2343	-4200	-4569		

2010 CVP & SWP Operations & Delta Conditions *(DRAFT – subject to revision)*

Date	Balance Excess	Jones PP (cfs)	Clifton Court export (cfs)	DCC	DAILY OMR (cfs)	5 Day OMR Calculation (cfs)	14 Day OMR Calculation (cfs)	Controlling	Concern Standards		
3/1/2010	E	3,719	3,773	C	-3294	-3751	-4557	OMR = -5000	OMR = -5000 Salmon BO	OMR = -5000 Smelt BO	
3/2/2010	E	4,174	3,972	C	-4904	-3890	-4645	FWS and NMFS BO			
3/3/2010	E	4,131	4,198	C	-5265	-4026	-4754				
3/4/2010	E	4,155	4,192	C	-4544	-4070	-4738				
3/5/2010	E	4,162	4,691	C	-3780	-4358	-4612				
3/6/2010	E	4,148	4,688	C	-6359	-4971	-4655				
3/7/2010	E	4,170	4,194	C	-6419	-5273	-4698				
3/8/2010	E	4,149	4,193	C	-6174	-5455	-4763				
3/9/2010	E	4,158	3,876	C	-4055	-5357	-4699				
3/10/2010	E	3,786	4,198	C	-5878	-5777	-4724				
3/11/2010	E	3,653	3,798	C	-4711	-5447	-4760				
3/12/2010	E	3,669	2,496	C	-5247	-5213	-4807				
3/13/2010	E	2,878	1,997	C	-3241	-4626	-4730				
3/14/2010	E	2,441	1,988	C	-2317	-4279	-4728				
3/15/2010	E	2,661	2,478	C	-2215	-3546	-4651				
3/16/2010	E	2,720	2,995	C	-3142	-3232	-4525				
3/17/2010	E	2,711	3,491	C	-3769	-2937	-4418				
3/18/2010	E	3,251	3,498	C	-4902	-3269	-4443				
3/19/2010	E	3,487	3,491	C	-4912	-3788	-4524				
3/20/2010	E	3,483	3,491	C	-5186	-4382	-4441				
3/21/2010	E	3,488	3,497	C	-5388	-4831	-4367				
3/22/2010	E	3,490	3,498	C	-5370	-5152	-4309				
3/23/2010	E	2,880	3,999	C	-4553	-5082	-4345	E/I			D1641 E/I
3/24/2010	E	2,717	3,997	C	-4741	-5048	-4264				
3/25/2010	E	2,798	3,991	C	-4768	-4964	-4268				
3/26/2010	E	2,795	3,994	C	-3879	-4662	-4170				
3/27/2010	E	2,795	3,654	C	-4034	-4395	-4227				
3/28/2010	E	2,782	3,983	C	-4790	-4443	-4404				
3/29/2010	E	2,795	3,463	C	-4906	-4476	-4596				
3/30/2010	E	2,805	3,494	C	-5513	-4624	-4765				
3/31/2010	E	1,983	3,998	C	-4390	-4727	-4809				

2010 CVP & SWP Operations & Delta Conditions *(DRAFT – subject to revision)*

Date	Balance Excess	Jones PP (cfs)	Clifton Court export (cfs)	DCC	DAILY OMR (cfs)	5 Day OMR Calculation (cfs)	14 Day OMR Calculation (cfs)	Controlling	Concern Standards
4/1/2010	E	796	687	C	-2585	-4437	-4644	NMFS BO	OMR = -5000 Salmon BO / OMR = -5000 Smelt BO / NMFS BO IV.2.1 (combine export of 1,500 cfs)
4/2/2010	E	807	699	C	72	-3464	-4288	(combine export	
4/3/2010	E	826	692	C	77	-2468	-3912	of 1,500 cfs)	
4/4/2010	E	826	683	C	-60	-1377	-3531		
4/5/2010	E	827	654	C	197	-460	-3134		
4/6/2010	E	823	694	C	1556	369	-2697		
4/7/2010	E	822	699	C	947	544	-2291		
4/8/2010	E	823	696	C	36	535	-1948		
4/9/2010	E	824	697	C	368	621	-1645		
4/10/2010	E	824	691	C	-506	480	-1393		
4/11/2010	E	822	696	C	140	197	-1040		
4/12/2010	E	649	890	C	-119	-16	-698		
4/13/2010	E	618	893	C	992	175	-234		
4/14/2010	E	623	898	C	895	280	144		
4/15/2010	E	833	690	C	748	531	382		
4/16/2010	E	826	689	C	328	569	400		
4/17/2010	E	827	694	C	891	771	458		
4/18/2010	E	827	699	C	903	753	527		
4/19/2010	E	829	724	C	1034	781	587		
4/20/2010	E	830	657	C	763	784	530		
4/21/2010	E	829	698	C	4252	1569	766		
4/22/2010	E	853	699	C	1930	1776	901		
4/23/2010	E	862	691	C	1224	1840	962		
4/24/2010	E	862	693	C	1455	1925	1103		
4/25/2010	E	862	693	C	388	1850	1120		
4/26/2010	E	862	695	C	-822	835	1070		
4/27/2010	E	854	692	C	770	603	1054		
4/28/2010	E	831	695	C	531	464	1028		
4/29/2010	E	831	691	C	1488	471	1081		
4/30/2010	E	831	694	C	2001	793	1200		

2010 CVP & SWP Operations & Delta Conditions *(DRAFT – subject to revision)*

Date	Balance Excess	Jones PP (cfs)	Clifton Court export (cfs)	DCC	DAILY OMR (cfs)	5 Day OMR Calculation (cfs)	14 Day OMR Calculation (cfs)	Controlling	Concern Standards
5/1/2010	E	831	694	C	1378	1234	1235	NMFS BO	OMR = -5000 Salmon BO; OMR = -5000 Smelt BO; NMFS BO IV.2.1 (combine export of 1,500 cfs)
5/2/2010	E	832	693	C	1014	1282	1243	(combine export	
5/3/2010	E	829	691	C	1167	1410	1253	of 1,500 cfs)	
5/4/2010	E	827	691	C	1939	1500	1337		
5/5/2010	E	825	709	C	1197	1339	1119		
5/6/2010	E	823	687	C	1961	1456	1121		
5/7/2010	E	822	693	C	749	1403	1087		
5/8/2010	E	823	699	C	620	1293	1027		
5/9/2010	E	824	695	C	1164	1138	1083		
5/10/2010	E	826	693	C	2891	1477	1348		
5/11/2010	E	820	681	C	425	1170	1323		
5/12/2010	E	823	692	C	416	1103	1315		
5/13/2010	E	825	693	C	-137	952	1199		
5/14/2010	E	826	693	C	18	722	1057		
5/15/2010	E	1,462	-	C	562	257	999		
5/16/2010	E	1,468	-	C	103	192	934		
5/17/2010	E	826	690	C	-79	93	845		
5/18/2010	E	825	694	C	-511	19	670		
5/19/2010	E	823	495	C	-870	-159	522		
5/20/2010	E	1,488	21	C	1147	-42	464		
5/21/2010	E	1,512	29	C	-50	-72	407		
5/22/2010	E	860	693	C	659	75	410		
5/23/2010	E	858	649	C	679	313	375		
5/24/2010	E	859	683	C	170	521	181		
5/25/2010	E	860	677	C	693	430	200	Preliminary injunction *	
5/26/2010	E	867	1,996	C	-224	396	154	OMR = -5000	
5/27/2010	E	2,825	1,994	C	-2438	-224	-10	FWS SMELT BO	
5/28/2010	E	2,829	2,992	O	-2434	-846	-185		
5/29/2010	E	2,824	3,487	O	-3490	-1578	-474		
5/30/2010	E	2,837	3,467	O	-4683	-2654	-816		
5/31/2010	E	2,829	3,497	O	-3815	-3372	-1083		

2010 CVP & SWP Operations & Delta Conditions *(DRAFT – subject to revision)*

Date	Balance Excess	Jones PP (cfs)	Clifton Court export (cfs)	DCC	DAILY OMR (cfs)	5 Day OMR Calculation (cfs)	14 Day OMR Calculation (cfs)	Controlling	Concern Standards
6/1/2010	E	2,835	3,722	C	-3383	-3561	-1288	OMR = -5000	OMR = -5000 Smelt BO
6/2/2010	E	2,834	3,995	C	-2817	-3638	-1427	FWS SMELT BO	
6/3/2010	E	3,138	3,993	C	-4313	-3802	-1817		
6/4/2010	E	3,509	3,292	O	-4955	-3857	-2168		
6/5/2010	E	3,503	3,673	O	-5082	-4110	-2578		
6/6/2010	E	3,515	3,990	O	-4318	-4297	-2935		
6/7/2010	E	3,506	3,862	C	-4109	-4555	-3240		
6/8/2010	E	3,516	3,992	C	-5879	-4868	-3710		
6/9/2010	E	3,519	3,975	C	-7190	-5315	-4207		
6/10/2010	E	3,525	3,483	C	-6379	-5575	-4489		
6/11/2010	E	3,045	3,496	C	-5566	-5824	-4713		
6/12/2010	E	2,838	3,494	C	-4554	-5914	-4789		
6/13/2010	E	2,838	3,489	C	-4470	-5632	-4774		
6/14/2010	E	2,842	3,497	C	-4125	-5019	-4796		
6/15/2010	E	2,839	2,997	C	-3671	-4477	-4816		
6/16/2010	E	2,837	1,978	C	-2925	-3949	-4824		
6/17/2010	E	2,823	3,976	C	-2288	-3496	-4679		
6/18/2010	E	2,821	3,971	O	-3214	-3245	-4555		
6/19/2010	E	2,829	3,988	O	-5098	-3439	-4556		
6/20/2010	E	3,306	3,996	O	-6501	-4005	-4712		
6/21/2010	E	3,518	3,499	O	-6445	-4709	-4879		
6/22/2010	E	3,529	3,494	O	-6598	-5571	-4930		
6/23/2010	E	3,530	2,991	O	-6430	-6214	-4876		
6/24/2010	E	3,408	1,997	O	-5964	-6388	-4846		
6/25/2010	E	2,831	2,499	O	-4458	-5979	-4767		
6/26/2010	E	2,612	2,493	O	-3797	-5449	-4713		
6/27/2010	E	2,610	2,496	O	-4163	-4962	-4691		
6/28/2010	E	2,644	3,493	O	-2712	-4219	-4590		

* This preliminary injunction, issued by the federal court, restricted further implementation of (a) the export component of Action IV.2.1, which limited combined exports to 1500 cfs, and (b) the calendar-based component of Action IV.2.3, which limited OMR to no more negative than -5000 cfs

Chapter 4 – Delta Fish Monitoring Summary

An extensive summary of fish monitoring data from October 2009 to July 2010 is provided in Appendix A.

Chapter 5 – Year in Review and Requests for Feedback

5.1 Successes

As intended, DOSS group meetings provided excellent opportunities for communication among the fisheries agencies and project operators on a near-weekly basis. Even during the summer hiatus, the DOSS e-mail distribution list allowed for easy check-ins on current issues. Additionally, the Tuesday morning DOSS meetings provided a forum for more in-depth consideration of issues in advance of the Tuesday afternoon WOMT meetings. The advice provided by DOSS to WOMT has generally been supported by WOMT, and WOMT decisions, in all cases, have been determined by NMFS to be in compliance with the NMFS BiOp.

The actions advised by DOSS implemented the various Delta RPA actions within the flexibilities outlined in the NMFS BiOp, as guided by information available to the group on fish monitoring and water operations (subject to occasional legal constraints which restricted implementation of certain Delta RPA actions). While the group's assessment of the effectiveness of the actions and the specific implementation of those actions is still very preliminary based on just over a year of experience in implementing the RPA's, the active tracking of current operations and fish monitoring data is clearly an essential component of adaptive management, and the DOSS group was an effective clearinghouse for bringing together technical staff to discuss real-time fisheries and operational needs.

A specific success of the DOSS group was in how it handled the changed water project operations caused by a planned power outage at the state's pumping facilities. The 10-day outage, scheduled to allow maintenance of a transmission line, occurred in mid-May at a time when combined CVP and SWP exports was limited to 1500 cfs under Action IV.2.1 of the NMFS BiOp. The sizing of the pumping units at the Federal pumping plant is such that pumping cannot be changed gradually, but must be stepped up or down by 800 cfs at a time. Given the 1500 cfs limit on combined exports, there was the potential for a 700 cfs/day loss of combined exports during the SWP outage period, unless the CVP pumps were cycled on and off daily. In order to avoid any export loss while also avoiding the wear and tear of rapid cycling of the CVP pumping units, DOSS spent several weeks[1] reviewing possible operational scenarios. The group was able to design a plan of operations that took advantage of the SWP's greater flexibility in pumping rate and the SWP's ability to isolate inflow to Clifton Court (the effective export rate from the Delta) from pumping operations in such a way that combined exports were maintained at 1500 cfs throughout the SWP outage.

[1] See DOSS notes from 4/20/2010, 4/27/2010, 5/4/2010 (most extensive discussion), and 5/11/2010, and the NMFS

5.2 Issues that arose in 2010 and are likely to be revisited by DOSS in 2011

OMR flows and fish triggers

The NMFS BiOp contains several actions which use observed fish salvage "triggers" to adaptively manage either exports or the net flows in Old and Middle Rivers (OMR) to reduce the risk of episodes of high loss at the export facilities. A summary of Actions IV.3 and IV.2.3 are provided below (in chronological order of implementation); full details can be found at the referenced pages in the NMFS BiOp.

Action IV.3 (NMFS BiOp at p. 652)

Date	Action Triggers	Action Responses
November 1 – December 31	Daily SWP/CVP older juvenile loss density greater than 8 fish/thousand acre feet (taf), or daily loss is greater than 95 fish per day, or Coleman National Fish Hatchery coded wire tagged late fall-run Chinook salmon (CNFH CWT LFR) or Livingston Stone National Fish Hatchery coded wire tagged winter-run (LSNFH CWT WNT) cumulative loss is greater than 0.5%.	Reduce exports to a combined 6,000 cfs for 3 days or until CVP/SWP daily density is less than 8 fish/taf. Export reductions are required when any one of the four criteria is met.
	Daily SWP/CVP older juvenile loss density greater than 15 fish/taf, or daily loss is greater 120 fish per day, or CNFH CWT LFR or LSNFH CWT WNT cumulative loss greater than 0.5%.	Reduce exports to a combined 4,000 cfs for 3 days or until CVP/SWP daily density is less than 8 fish/taf. Export reductions are required when any one of the four criteria is met.

Action IV.2.3 (NMFS BiOp at p. 648)

Date	Action Triggers	Action Responses
January 1 – June 15	January 1 – June 15	Exports are managed to a level that produces a 14-day running average of OMR that is no more negative than -5,000 cfs[2].
January 1 – June 15 **First Stage Trigger (increasing level of concern)**	Daily SWP/CVP older juvenile loss density (fish per taf) 1) is greater than incidental take limit divided by 2000 (2 percent WR JPE[3] ÷ 2000), with a minimum value of 2.5 fish per taf, or 2) daily loss is greater than daily measured fish density divided by 12 taf (daily measured fish density ÷ 12 taf) or 3) CNFH CWT LFR[4] or LSNFH CWT WR[5] cumulative loss greater than 0.5%, or 4) daily loss of wild steelhead (intact adipose fin) is greater than the daily measured fish density divided by 12 taf (daily measured fish density ÷ 12 taf)	Reduce exports[6] to achieve an average net OMR flow no more negative than -3,500 cfs[2] for a minimum of 5 consecutive days. Resumption of OMR flows as negative as -5,000 cfs flows is allowed when average daily fish density is less than trigger density for 3 consecutive days following the 5 consecutive days of export reduction.
January 1 - June 15 **Second Stage Trigger (analogous to high concern level)**	Daily SWP/CVP older juvenile loss density (fish per taf) is 1) greater than incidental take limit (2 percent of WR JPE) divided by 1000 (2 percent of WR JPE ÷ 1000), with a minimum value of 2.5 fish per taf, or 2) daily loss is greater than daily fish density divided by 8 taf (daily fish density ÷8 taf), or 3) CNFH CWT LFR or LSNFH CWT WR cumulative loss greater than 0.5%, or 4) daily loss of wild steelhead (intact adipose fin) is greater than the daily measured fish density divided by 8 taf (daily measured fish density ÷ 8 taf)	Reduce exports[6] to achieve an average net OMR flow of (minus) -2,500 cfs for a minimum 5 consecutive days. Resumption of OMR flows as negative as -5,000 cfs flows is allowed when average daily fish density is less than trigger density for 3 consecutive days following the 5 consecutive days of export reduction.
End of Triggers	Continue action until June 15 or until average daily water temperature at Mossdale is greater than 72°F (22°C) for 7 consecutive days, whichever is earlier.	If trigger for end of OMR regulation is met, then the restrictions on OMR are lifted.

[2] The five-day running average flow shall be no more than 25 percent more negative than the targeted requirement flow.
[3] Juvenile production estimate (JPE) for winter-run Chinook salmon (WR)
[4] Coleman National Fish Hatchery (CNFH) coded wire tagged (CWT) late fall-run (LFR) Chinook salmon
[5] Livingston Stone National Fish Hatchery (LSNFH) coded wire tagged (CWT) winter-run (LFR) Chinook salmon
[6] Reductions are required when any one criterion is met.

Below is a summary of the real-time implementation of actions taken in response to fish triggers, in chronological order. Full meeting notes are provided online at: http://swr.nmfs.noaa.gov/ocap/doss.htm.

An "increased movement of ESA listed species into the Delta," was noted at the 2/2/10 DOSS meeting. However, at that time, no action was implemented to reduce exports since the daily loss observed at the salvage facilities was still lower than the first criterion.

> "Daily loss density (daily loss/exports) reached approximately 8 on 1/27 (see Sheila's graph dated 2/1 on website below). For purposes of calculating the OMR criteria in the NMFS BiOp, DWR calculated the following based on non-clipped winter-run loss and a preliminary JPE of 1,144,860 (2% of JPE = 22,897). The first OMR fish density trigger is 22897 / 2000 = 11.4, and the second fish density trigger would be 22897 / 1000 = 22.9 Since the daily loss density, which ranged from 2 to 8 fish per TAF last week < 11.4, DOSS concluded the OMR fish density trigger in the NMFS biological opinion had not been reached. Fish monitoring data did not trigger or warrant any operational changes." *(excerpt from DOSS notes 2/2/10).*

At this point DOSS began monitoring daily loss in terms of fish density and hatchery fish (winter-run and Late-fall Chinook) on a weekly basis, based on information provided by DWR (similar to the information presented on pages 6 and 8 of Appendix A) and CDFG (salvage and loss estimates for the CVP and SWP). Two groups of uniquely marked hatchery late-fall Chinook salmon are used as surrogates for spring-run Chinook yearlings as they migrate from the tributaries (*i.e*., Deer Creek, Mill Creek, and Antelope Creek) to the Delta.

> "DOSS concluded the fish monitoring data indicates that listed salmon and steelhead have entered the delta and are being entrained at the export pumps in relatively low numbers. Daily fish loss densities (fish/TAF) are running under 2.1 right now. DOSS discussed the loss of spring-run surrogates from the 2 release groups and concluded that in-river survival was likely higher for the 1/14 release group due to the timing of their release during a storm event (subject to higher flows and less time reaching the Delta). Therefore, more surrogates from the 1/14 release were being observed in the salvage at this time." *(excerpt from DOSS notes 2/16/10)*

Based on the monitoring data, DOSS knew on 2/16/10 and 2/18/10 that the number of hatchery fish used as surrogates was likely to have exceeded the 0.5% criteria in the NMFS BiOp and reported this information to NMFS and WOMT. However, due to the temporary restraining order issued by Judge Wanger on 2/5/2010 (which prohibited the implementation of Action IV.2.3 of the NMFS RPA), no action was advised, or taken, to implement an export reduction to manage OMR. DOSS noted that the pulse of fish that came through the fish facilities was probably already past due to a lag time in processing the coded wire tags (CWTs). Real time monitoring of the loss of hatchery winter-run and late fall Chinook can be delayed by the time it takes to read the CWTs and report the information. This lag time can be 1-2 weeks depending on when the tags are picked up and transported to the tag lab.

The DOSS technical team continued to monitor fish salvage on a weekly basis and on 3/9/10 advised shifting to daily monitoring since the fish density was approaching the first stage trigger.

> "Salvage is likely to remain high, but is still under the modified criteria in the NMFS opinion (8 fish/ TAF) that would require a more restrictive OMR flow. There was discussion as to the criteria used in the NMFS opinion on page 649 and DOSS concluded that clarification of the triggers were needed" *(excerpt from DOSS 3/9/10).*

On 3/9/10 the fish density trigger (loss density > 8 fish/TAF) was exceeded. The DOSS group discussed the recent loss densities on 3/11/10 and advised WOMT.

> "DOSS discussed the potential benefits of the JPE-based versus absolute loss density triggers. All acknowledged the value of the first trigger, which is scaled to the current JPE. Some felt that this was adequate to protect the juvenile population. The first take concern level this year is 11,796, and the reconsultation level is 23,592. The current combined loss at the facilities is ~1,200. Because the combined loss is low, DWR concluded that protection beyond trigger #1 (*i.e*., fish density trigger based on winter-run JPE) is not necessary at this time. Others felt that an additional fish density trigger not tied to the JPE would provide important protection against sporadic episodes of high salvage events." *(excerpt from DOSS notes 3/11/10)*

After discussing the pros and cons of several options DOSS advised WOMT and NMFS to implement only the first and third triggers while DOSS evaluated the second trigger. NMFS accepted this advice and the NMFS determination relating to this issue is provided, along with the DOSS notes from 3/11/10, in Appendix B.

A smaller subgroup of agency biologists met twice to discuss the history and calculations used to develop the fish triggers. This DOSS subgroup concluded that the second trigger (daily loss > daily density/12 TAF) as written could not be implemented because it was not mathematically correct (i.e., always resulted in a number less than the daily loss), and that the intended trigger, based on analysis used to develop the Salmon Decision Tree, was met when daily loss > 12/TAF * Exports). The subgroup has not yet provided official advice to NMFS or WOMT on this issue.

OMR transitions

OMR (the net tidal flow measurement in Old and Middle Rivers combined) is utilized in NMFS' and FWS' reasonable and prudent alternatives to reduce the likelihood that listed species will be entrained in the CVP and SWP fish collection facilities associated with the CVP and SWP pumping plants in the southern delta. Managing to the required OMR flows under the NMFS and FWS BiOps was frequently a constraint on joint project exports at Clifton Court Forebay and Jones Pumping Plant (causing a curtailment of exports compared to operations absent any OMR requirement). OMR flows are definitely affected by total project exports in the south Delta,

but are also affected by astronomical tides, barometric pressure, wind speed and direction, south Delta agricultural diversions (*i.e*., depletions) and flows on the San Joaquin River at Vernalis. In addition, OMR flow data are measured by the USGS on a real-time basis, but the actual measurements are typically not available to project operators until 2-3 days after the measurements are made. Due to this, project operators use an OMR "predictive value" (*i.e*., calculated from an alternative tidally filtered algorithm) to develop estimates of actual OMR measurements during day-to-day project operations.

One of the difficulties that operators and biologists worked through during 2010 deals with the "transition" between different targeted OMR levels from week to week, and how to implement the transition in a realistic way for project operations while still providing the intended biological level of protection. This transition is very complicated, so a simple numerical example may best illustrate the complexity that DOSS and WOMT grapple with on a routine basis.

For this example, assume that in Week 1, no OMR flows are prescribed. At the start of Week 2, OMR flows are set to be no more negative than -5000 cfs (on a 14 day average basis). At the start of Week 3, because it is perceived that fish are increasingly subject to entrainment at project export facilities, OMR flows are set to be no more negative than -3000 cfs (on a 14 day average basis). This is the regulatory setting for our example.

From a project operations perspective, assume that OMR flows were averaging about -7000 cfs in Week 1 when no OMR flows were prescribed. At the start of Week 2, project operators know they need to meet an OMR target of no more negative than -5000 cfs on a 14 day average basis. Exports are reduced accordingly, but a period of high tides in combination with a low pressure barometric system results in an average OMR of -6000 cfs at the end of Week 2. Since the target for protection was -5000 cfs on a 14 day average, operators know that they need to have an average OMR of no greater than -4000 cfs for the next week to achieve the -5000 cfs target (i.e. -6000 cfs for 7 days plus -4000 cfs for 7 days equals -5000 cfs average for 14 days). However, as mentioned above, the target level for protection at the start of Week 3 has been further reduced to no more negative than -3000 cfs. At this point, since OMR flows for Week 3 are projected to be at -4000 cfs, the only way to comply with the -3000 cfs target for 14 days at the end of Week 4 is to further reduce project exports to target the OMR average flow for Week 4 to be no more negative than -2000 cfs. At this very low level of OMR flows, project operations will be constrained by exports necessary to protect public health and safety. Given the uncertainty of tidal effects, changing meteorological conditions and south Delta diversions, the ability to achieve the target level of -2000 cfs during Week 4 is highly uncertain and speculative. In situations like this, when the required OMR flow drops several times in quick succession, the project operators have expressed a concern that the protective standard, although well meant, has been set in a way that can be very difficult for project operators to meet. In particular, the operators are concerned that in some very specific situations (rapid, successive, changes to the most restrictive OMR standard, coupled with strong tidal or weather

influences on OMR), the 5-day OMR standard may be impossible to meet without lowering exports below 1500 cfs[7].

This example points out the need for operators and biologists to reach agreement on a way to transition project operations between OMR targeted levels from week to week in a way that allows for realistic project operations while providing meaningful and significant protection for sensitive species. DOSS will continue to work in conjunction with the Smelt Working Group (SWG) and the Water Operation Management Team (WOMT) during Water Year 2011.

Need for improved turnaround time of reporting of loss density at the fish facilities

As already mentioned in the discussion of managing OMR flows, lags in reporting time of fish salvage (of up to a week) and in reporting the origins of fish with coded-wire tags (lags of up to one month) impair the ability of DOSS to review fish data in a timely manner and provide timely advice to NMFS and WOMT on actions that should be taken in terms of export rates or OMR flows.

Review of genetic data to assess validity of the size-at-date criteria used to assign salvaged fish to race

In many of the fish monitoring studies in the Central Valley, as well as in estimation of the salvage of juvenile Chinook salmon at the SWP and CVP fish collection facilities, individual Chinook are assigned to a particular run using size-at-date criteria that were developed in the 1990s. It should be noted that the CVP and SWP salvage facilities use a different size-at-date criteria than the monitoring studies elsewhere. More recently, genetic research has developed techniques to assign juvenile Chinook to their ESU of origin (winter, spring, fall/late fall). Although the development of these techniques for real time management remains in its infancy in California, since it can take days to turn around samples, there are numerous applications of the genetic results concerning ESU of origin for fish monitoring and operational workgroups being implemented for OCAP. Some of these uses include accurate identification of take for ESA-listed species, accurate information for developing relationships from fish monitoring

[7] The project agencies have identified significant logistical challenges in achieving the required OMR flows. First, the transition per se to a new OMR limit requires changes to be made on short notice to the pumping plants and associated facilities, with consequences that may include financial penalties. Second, on occasions when the OMR flow may be restricted to levels no more negative than -3000 cfs, the projects may need to operate more closely (or more frequently) to the minimum export levels required for public health and safety. Third, as mentioned earlier, the project operators expect that meeting the 5-day average may not always be possible. Spurred by the development of this annual report, DOSS has only recently engaged in discussion about some of these "behind-the-scenes" logistical challenges identified by the project agencies. DOSS expects to tackle this issue more thoroughly in the upcoming months.

observations and physical factors (*i.e*., flow, temperature, water quality, habitat), and use in pilot projects evaluating techniques for batch tagging of hatchery fishes for monitoring studies. While DOSS has relied upon the size-at-date criteria, DOSS may benefit from increased coordination with other interagency groups (*i.e*., IEP salmonid genetics work team, multiple IEP salmonid monitoring workteams) to ensure the best available science is being implemented for determining the ESU of origin for salmonids and thorough evaluation of genetic results for monitoring and managing listed salmonids. The 2010-11 DOSS group has identified this issue as something for further smaller group discussion to evaluate how genetic results may be integrated into DOSS monitoring and management at appropriate temporal and spatial opportunities.

5.3 Request for feedback

DOSS is particularly interested in advice from the panel on the following questions:

- Does the panel have any suggestions for the subgroup that is evaluating the genesis of the second fish density trigger in Action IV.2.3?

- What advice can the panel provide on how to transition project operations between OMR targeted levels from week to week in a way that allows for realistic project operations while providing meaningful and significant protection for sensitive species?

- What are the panel's suggestions for improving DOSS's ability to provide timely advice in response to real-time salvage data, including the tracking of CWT data?

APPENDIX A

2009/2010 SALMONIDS AND GREEN STURGEON INCIDENTAL TAKE AND MONITORING PROGRAM ANNUAL DATA REPORT

October 2010 -- DRAFT

Angela Llaban
Division of Environmental Services
Department of Water Resources

2009/2010 SALMONIDS AND GREEN STURGEON INCIDENTAL TAKE AND MONITORING PROGRAM ANNUAL DATA REPORT

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2009/2010 SALMONIDS AND GREEN STURGEON INCIDENTAL TAKE AND MONITORING PROGRAM ANNUAL DATA REPORT

This annual data report is required for the NMFS 2009 Biological Opinion for the Operation of the Federal Central Valley Project (CVP) and the California State Water Project (SWP) under the Joint CVP and SWP Terms and Conditions. The report is a summary of the incidental take of winter-run, Coleman Hatchery late-fall Chinook surrogate releases, steelhead and green sturgeon at the State and federal Delta Fish Facilities. This report also includes data from the salmonid monitoring program for the lower Sacramento River and Delta, the yearling spring-run Chinook monitoring in Mill and Deer creeks, and hydrologic conditions in the Delta. DWR acquired data from the source agencies, Department of Fish and Game (DFG), United States Fish and Wildlife Service (USFWS-Stockton), and Department of Water Resources. We disseminated preliminary versions of the Chinook data and DFG disseminated preliminary versions of the steelhead data on a weekly basis through the Data Assessment Team (DAT) during the 2009/2010 incidental take season (October 2009-July 2010). These data are still preliminary and subject to revision.

Winter-run Chinook Incidental Take

In 2010, DFG estimated a total adult escapement of 4,537 winter-run to the upper Sacramento River based on the carcass survey. Based on this escapement, NOAA estimated that 1.18 million juveniles would enter the Delta. The incidental take level for the Delta Fish Facilities is 2% of the winter-run juveniles entering the Delta, or 23,593 for 2009/2010. The combined expanded loss of winter-run length Chinook was 1,660 for the season; well below the incidental take level of 23,593. Most of the winter-run loss occurred from mid-January and March (Figure 1). The loss was split between the two facilities with an expanded loss of 1,072 at SWP and 588 at CVP. In 2009/2010 the winter run length loss was relatively low compared to the last eight years (Figure 2).

On February 10, 2010 approximately 198,582 winter-run smolts from Livingston Stone National Fish Hatchery were released on the Sacramento River near Redding. Based on the carcass survey, it was estimated that 108,725 hatchery production fish would enter the Delta. Twenty-nine hatchery Chinook were recovered at the Delta Fish Facilities for an expanded loss of 140 fish or 0.128% of the total entering the Delta (Table 1). The incidental take limit for these fish is 1% of the total entering the delta, or 1,087 for 2009/2010. The hatchery Chinook ranged in length from 96 mm to 121 mm, averaging 109 mm and were salvaged in late February and March.

Appendix 1 is the weekly Delta Fish Facilities Winter-Run Chinook Incidental Take report which is a current version of DFG salvage and loss data. We summarized the data on a daily basis for winter-run Chinook and for all Chinook based on length, using the Delta model length criteria, for both non-clipped and adipose fin-clipped Chinook salmon.

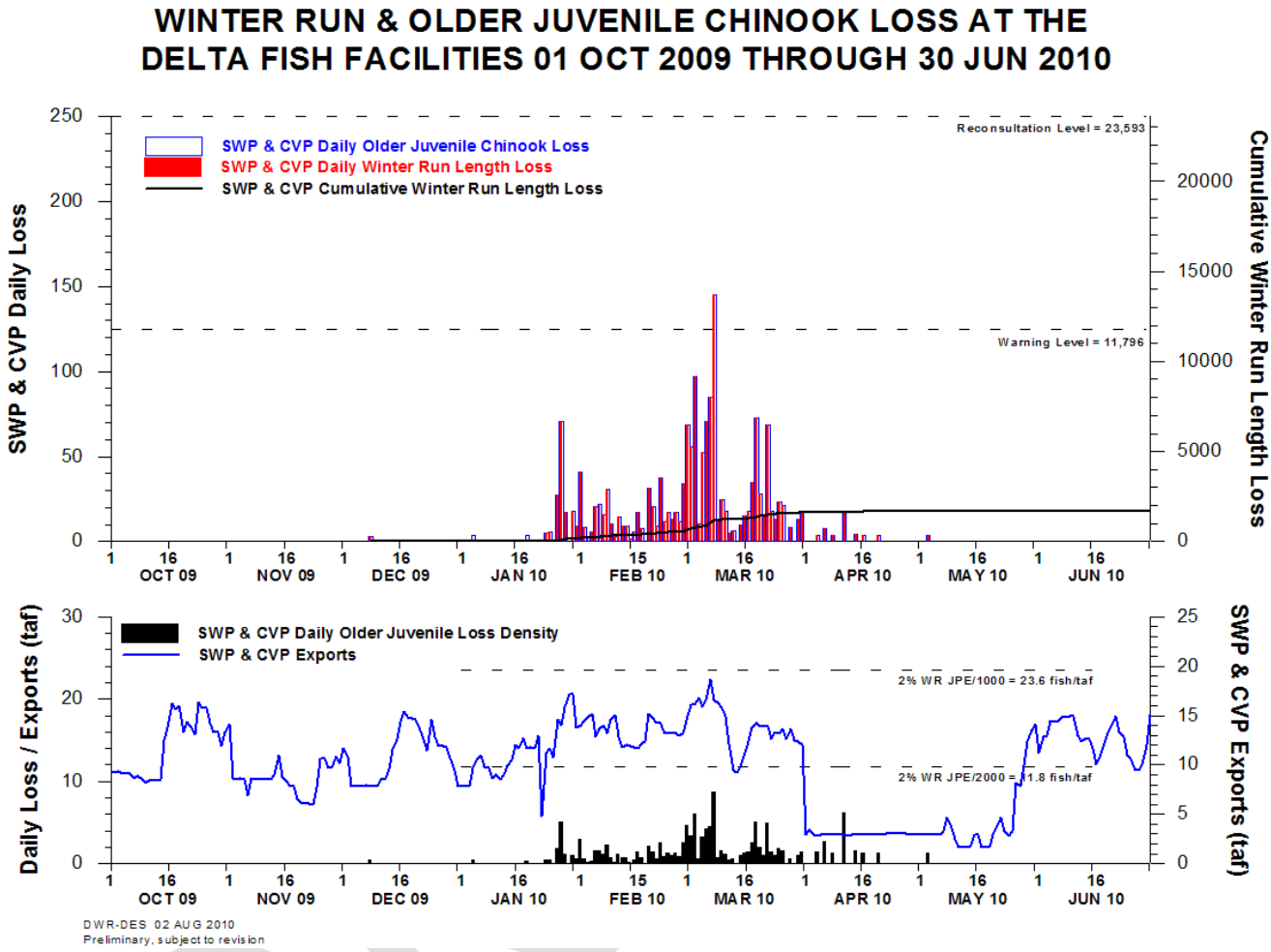

Figure 1. Winter-run length and older juvenile Chinook loss at the Delta Fish Facilities, October 2009 through June 2010.

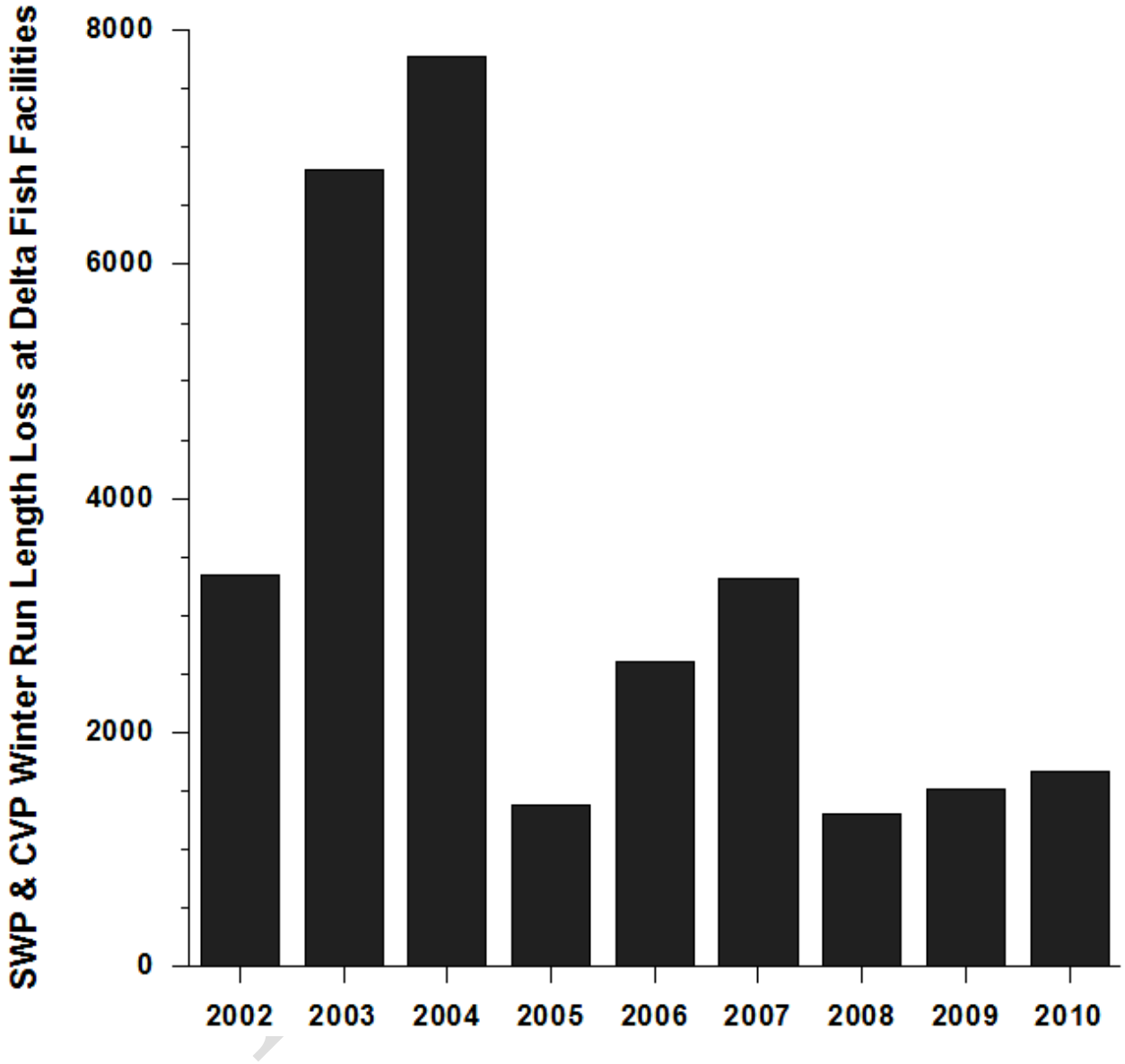

Figure 2. Winter-run length Chinook loss at the Delta Fish Facilities, water years 2002 through 2010.

Table 1. Coleman Hatchery late-fall Chinook and Livingston Stone winter Chinook loss at the Delta Fish Facilities, 2009-2010.

Coleman Hatchery Late-Fall and Livingston Stone Winter Chinook Loss at the Delta Fish Facilities, 2009/2010, BASED ON DWR EDITS TO FWS CWT DATA

Release Date	CWT Race	Release Site	Confirmed Loss	Number Released	Total Entering Delta	% Loss[1]	First Concern Level	Second Concern Level	Date of First Loss	Date of Last Loss
12/16/2009	LF	Battle Creek	1153.27	904699	n/a	0.127	n/a	n/a	12/26/2009	3/19/2010
12/28/2009	LF	Battle Creek	56.73	75676	n/a	0.075	0.5%	1.0%	1/22/2010	2/2/2010
1/14/2010	LF	Battle Creek	960.35	174386	n/a	0.551	0.5%	1.0%	1/24/2010	3/9/2010
2/10/2010	W	Redding[2]	139.59	198582	108725	0.128	0.5%	1.0%	2/24/2010	3/24/2010

DWR ESTIMATE OF NON-CONFIRMED TAGGED LOSS AND NEW TOTAL TAGGED LOSS THROUGH 5/2/2010

Non-confirmed Tagged Loss by DWR-DES Race Assignment[3]

DWR Race	Unknown[4] Loss	Unread Tag Loss	Total NON-confirmed Loss
LF	132.30	0.00	132.30
W	44.24	0.00	44.24

Number of unread tags: 0

Release Date	CWT Race	Confirmed Loss	Proportion Confirmed Loss	NON Confirmed Loss	New Total Loss	Number Released	Total Entering Delta	New Total % Loss
12/16/2009	LF	1153.27	0.531	70.30	1223.57	904699	n/a	0.135
12/28/2009	LF	56.73	0.026	3.46	60.19	75676	n/a	0.080
1/14/2010	LF	960.35	0.442	58.54	1018.89	174386	n/a	0.584
2/10/2010	W	139.59	n/a	44.24	183.83	198582	108725	0.169

For Chinook lost 10/1/2009 through 7/31/2010
SWP Tags read 10/1/2009 through 7/31/2010
CVP Tags read 10/1/2009 through 7/31/2010
[1]LF % Loss = (Confirmed Loss/Number Released) x 100; W % Loss = (Confirmed Loss/Total Entering Delta) x 100
[2]Livingston Stone winter-run Chinook release
[3]DWR-DES assigns race by comparing length-at-date of non-confirmed fish to length-at-date data for confirmed fish (tagged fish matched to a release group)
[4]Damaged tag, lost tag, no tag or missing fish
Revised 7/31/2010

Spring-run Chinook Incidental Take

Under the 2009 NMFS Biological Opinion, NMFS uses surrogate groups of hatchery reared late-fall Chinook to best represent yearling spring-run Chinook emigrating from the upper Sacramento River and tributaries into the Delta because spring-run Chinook cannot be distinguished from the other races of salmon based on size or phenotype. Under the Term and Condition #4c, the incidental take from the combined operation of the Delta pumping plants would be equal to one percent of any individual Coleman Hatchery late fall Chinook surrogate release group. The USFWS, through an adaptive process, releases approximately 17% of the total Coleman Hatchery late fall production into two separate surrogate releases. The first release is made in November or December and the second release in January. FWS releases all of the surrogate groups into the Sacramento River at Battle Creek.

November/December Surrogate Release

The first surrogate group of approximately 75,676 Coleman Hatchery late fall Chinook salmon was released on December 28, 2009. The rotary screw traps on the two spring-run tributaries, Mill and Deer Creeks, were operating at this time. DFG caught yearling spring-run Chinook salmon starting in mid-October in the Mill Creek trap and starting in late November in the Deer Creek trap.

Four surrogates from the December release were observed at the Delta Fish Facilities between late January and early February (Figure 3). The expanded loss for the season was approximately 57 or 0.075% of the total hatchery release (Table 1). The surrogate loss occurred after the time period of peak loss of the older juvenile Chinook at the Delta Fish Facilities (Figure 3). Using the Delta Model length criteria we defined older juvenile Chinook as all Chinook larger than the minimum winter run length. Older juvenile length Chinook include yearling fall-run, yearling spring-run, late-fall, and winter-run length Chinook.

January Surrogate Release

The second surrogate group of approximately 174,386 Coleman Hatchery late fall Chinook salmon was released on January 14, 2010. The rotary screw traps on both spring-run tributaries were operating at this time, but the catch of yearling spring-run Chinook was low (Figure 4).

One hundred thirty-seven surrogates were observed at the Delta Fish Facilities between late January and early March. The expanded loss for the season was approximately 960 or 0.55% of the total hatchery release, below the 1% incidental take level (Table 1).

Fry/smolt Chinook Loss

The combined expanded loss of fry/smolt Chinook salvaged between October and July was 9,950. The loss was relatively low compared to the last 9 years (Figure 5). The spring 2010 water year type was above normal with an average flow on the San Joaquin River at Vernalis of 4,626 cfs for April and May 2010. Flows during this period were supplemented with additional water as part of the Vernalis Adaptive Management Program (VAMP). Using the Delta Model length criteria we defined fry/smolts as all Chinook smaller than the minimum winter run length.

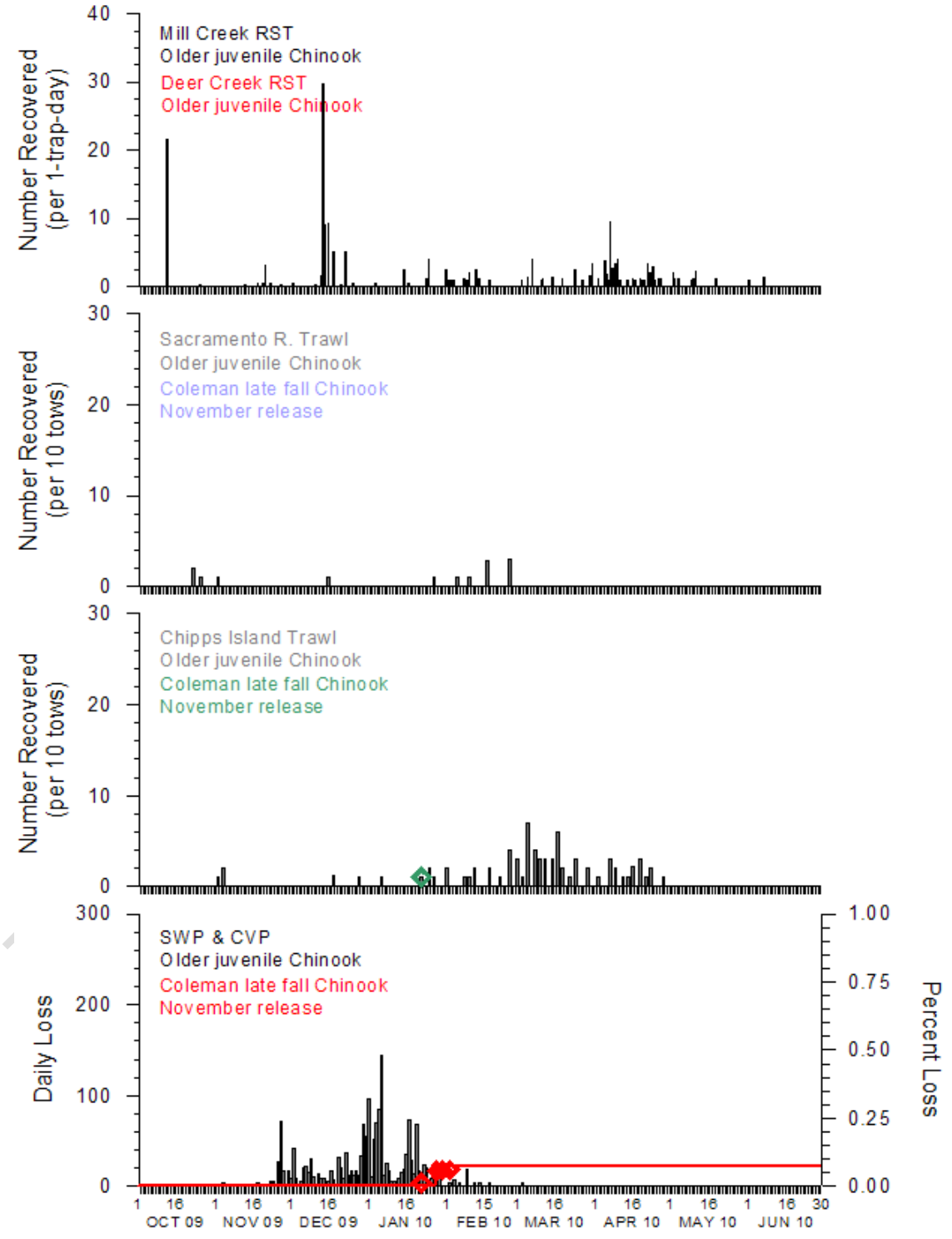

Figure 3. Older juvenile Chinook and Coleman Hatchery late-fall recoveries in the monitoring program and loss at the Delta Fish Facilities, December 2009 surrogate release.

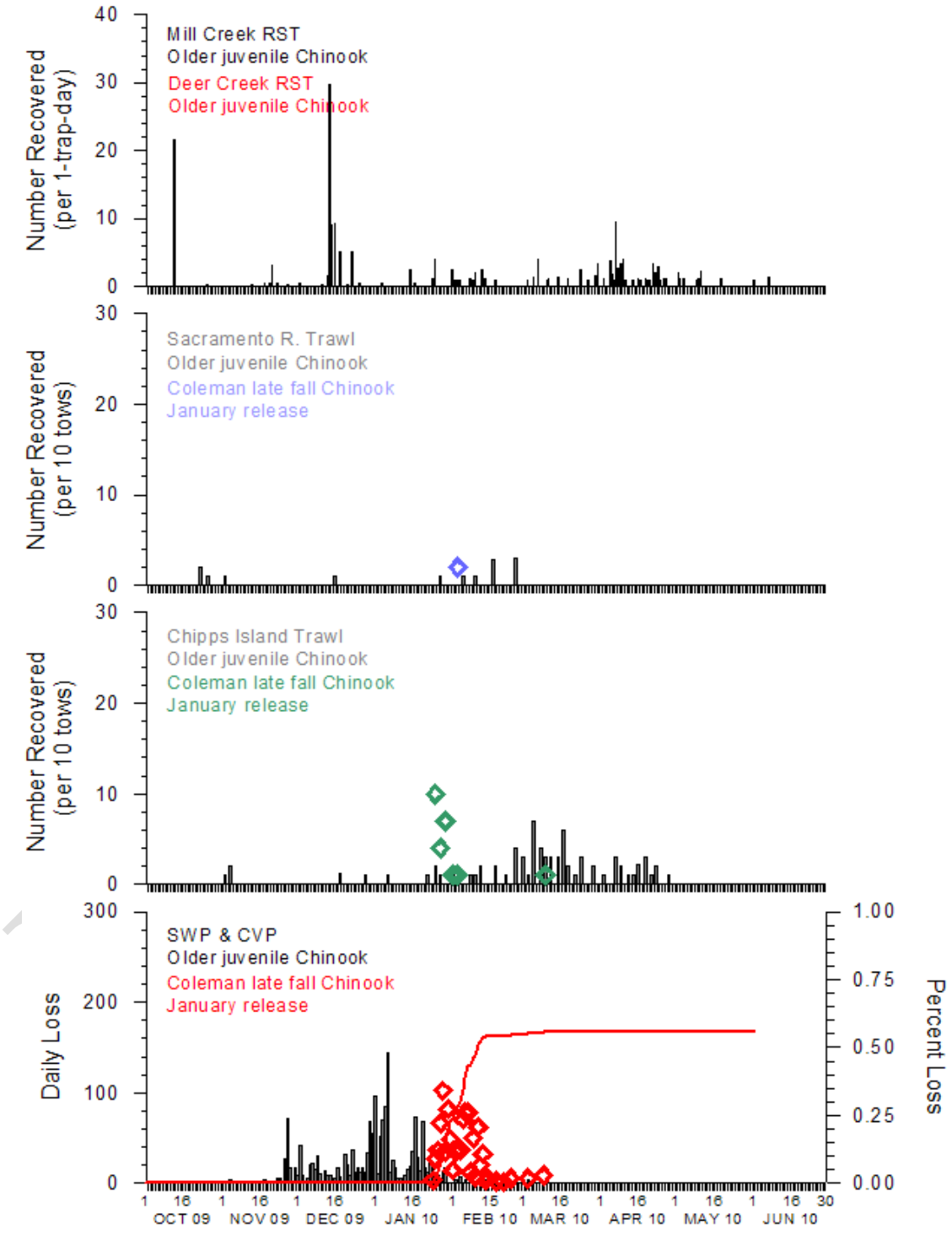

Figure 4. Older juvenile Chinook and Coleman Hatchery late-fall recoveries in the monitoring program and loss at the Delta Fish Facilities, January 2010 surrogate release.

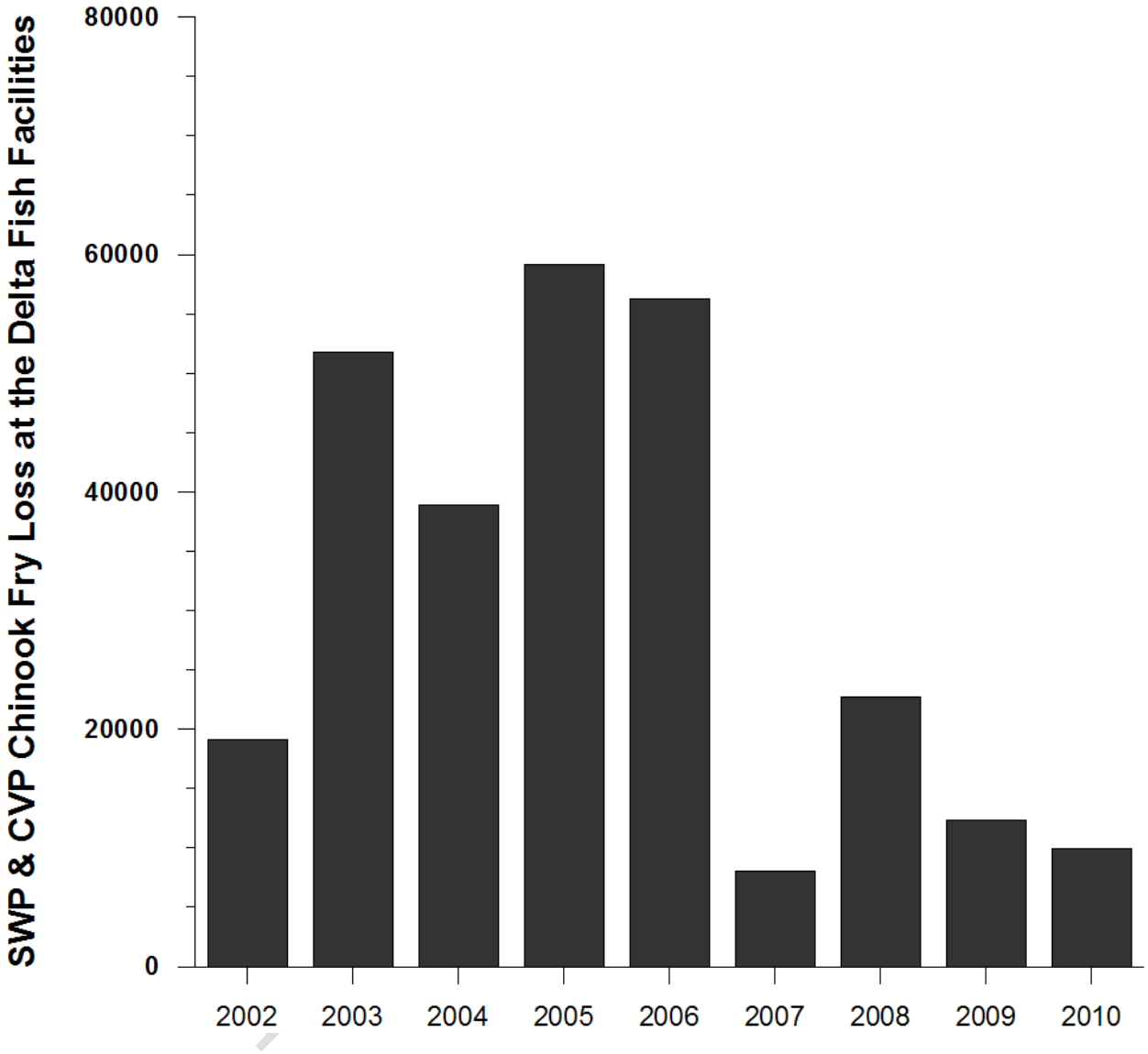

Figure 5. Fry/smolt Chinook loss at the Delta Fish Facilities, water years 2002 through 2010.

Juvenile Steelhead Incidental Take

From October 2009 to July 2010 the total expanded salvage of juvenile in-river steelhead was 1,029, remaining below the salvage limit of 3,000, and the juvenile hatchery steelhead salvage was 3,585 (Figures 6 and 7). The total expanded salvage of hatchery steelhead, between October and May, increased compared to 2008/2009. More than half of both in-river and hatchery steelhead salvage occurred at the CVP. For in-river steelhead, CVP salvaged a total of 628 and SWP salvaged 401, with the peak in February (Figure 8). For hatchery steelhead, CVP salvaged a total of 2,459 and SWP salvaged 1,126 (Figure 9).

Green Sturgeon Incidental Take

Between October 2009 and July 2010, there was no take of green sturgeon at the Delta Fish Facilities.

Lower Sacramento River and Delta Salmonid Monitoring Program

The Delta Juvenile Fish Monitoring Program (DJFMP) conducted by the U.S. Fish and Wildlife Service's Stockton Fish and Wildlife Office operates under the auspices of the Interagency Ecological Program (IEP). The DJFMP has been conducting juvenile salmon monitoring in the Delta since the early 1970's and the goals include gaining information on potential management actions that could improve the survival of juvenile salmon rearing and/or migrating through the Delta and to document non-salmonid temporal and spatial distribution. To facilitate data summarization for this report we divided the Beach Seine monitoring program into six areas: 1) Lower Sacramento River (Colusa St. Park to Elkhorn), 2) North Delta (Discovery Park to Isleton), 3) Central Delta (King Island to Antioch Dunes), 4) South Delta (Dad's Point to Woodward Island), 5) San Joaquin (North of Tuolumne River to Dos Reis) and 6) the Bay. We separated non-adipose fin clipped older juveniles from fry/smolts using the Frank Fisher model.

Spring-run Surrogates Monitoring

FWS recovered zero surrogates from the December release in the Sacramento River trawl (Figure 3). Two surrogates from the January release were recovered in early February, which occurred slightly before a small pulse of older juvenile Chinook mid-February (Figure 4).

FWS recovered one surrogate from the December release as it was leaving the Delta, at Chipps Island, in mid-January. The surrogate was recovered several weeks before the peak period when most of the older juveniles were caught at Chipps Island (Figure 3). FWS recovered 23 surrogates from the January release at Chipps Island between January 25th and March 10th (Figure 4). The majority of these surrogates were recovered in late January and early February, before the peak of older juvenile catch at

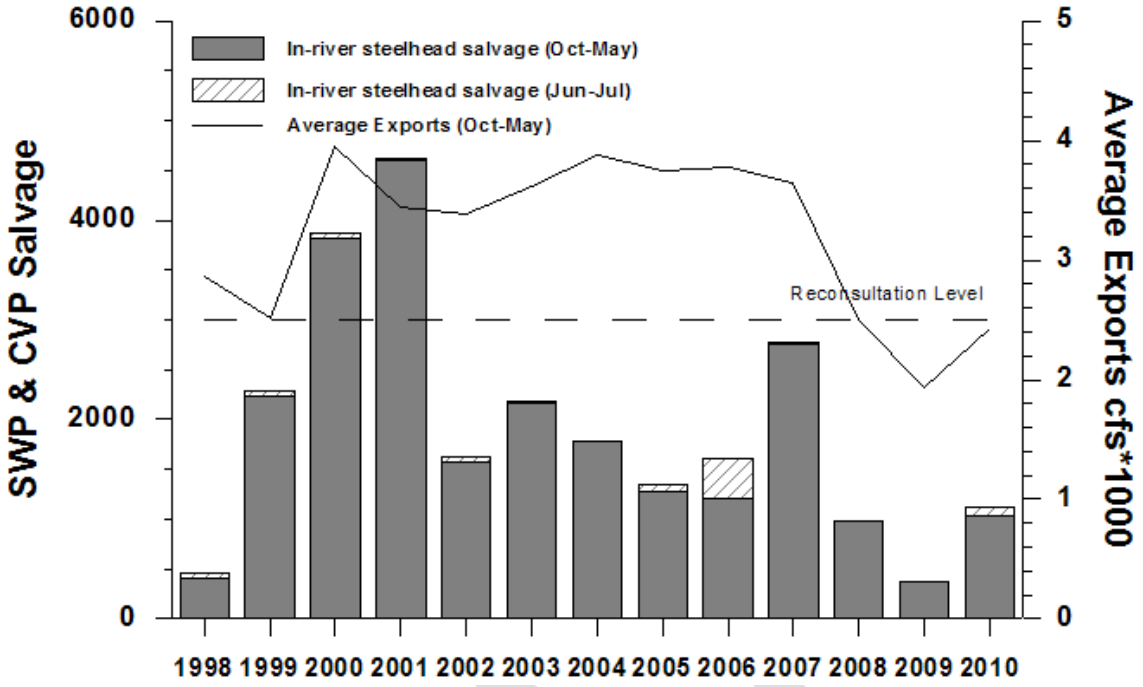

Figure 6. Juvenile in-river steelhead salvage at the SWP & CVP Delta Fish Facilities, water years 1998 through 2010.

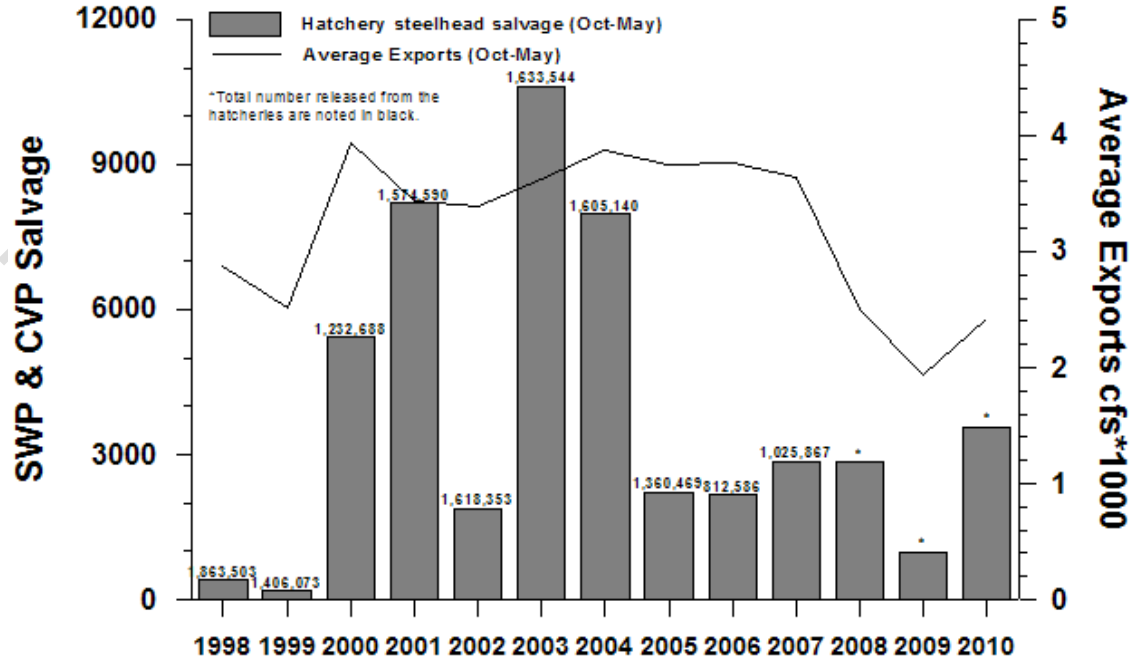

Figure 7. Juvenile hatchery steelhead salvage at the SWP & CVP Delta Fish Facilities, water years 1998 through 2010.

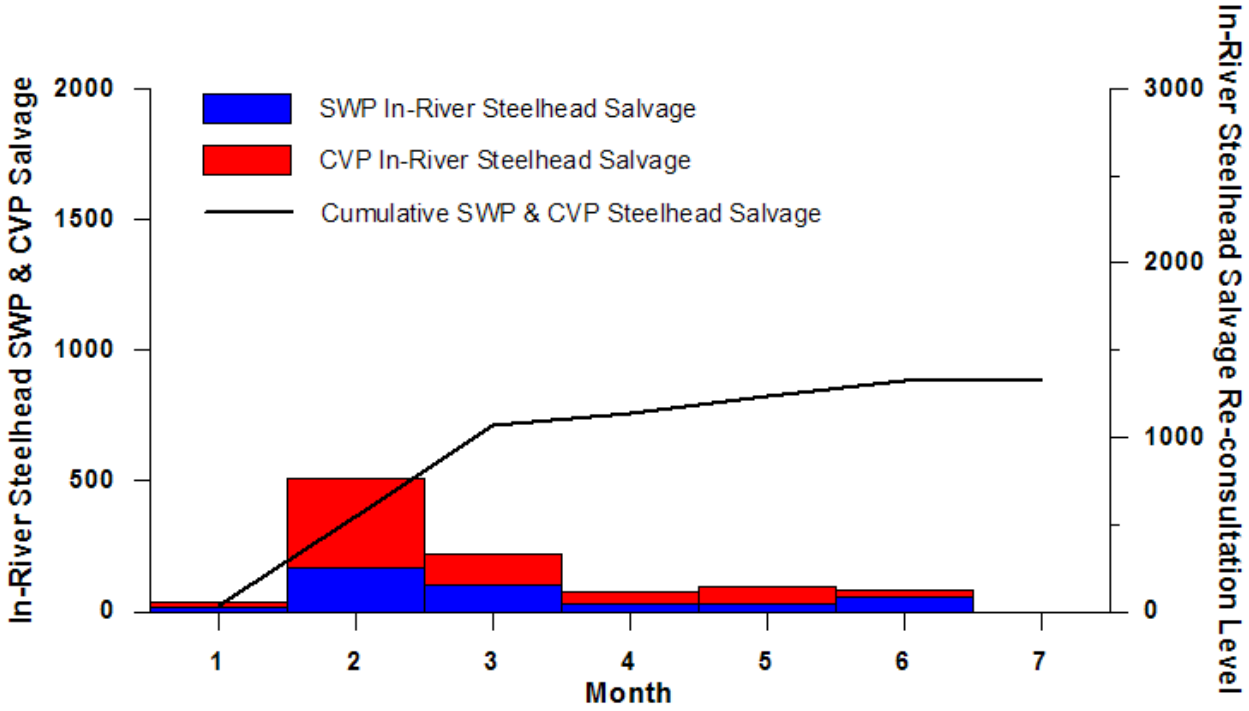

Figure 8. Juvenile in-river steelhead salvage at the Delta Fish Facilities, October 2009 through July 2010.

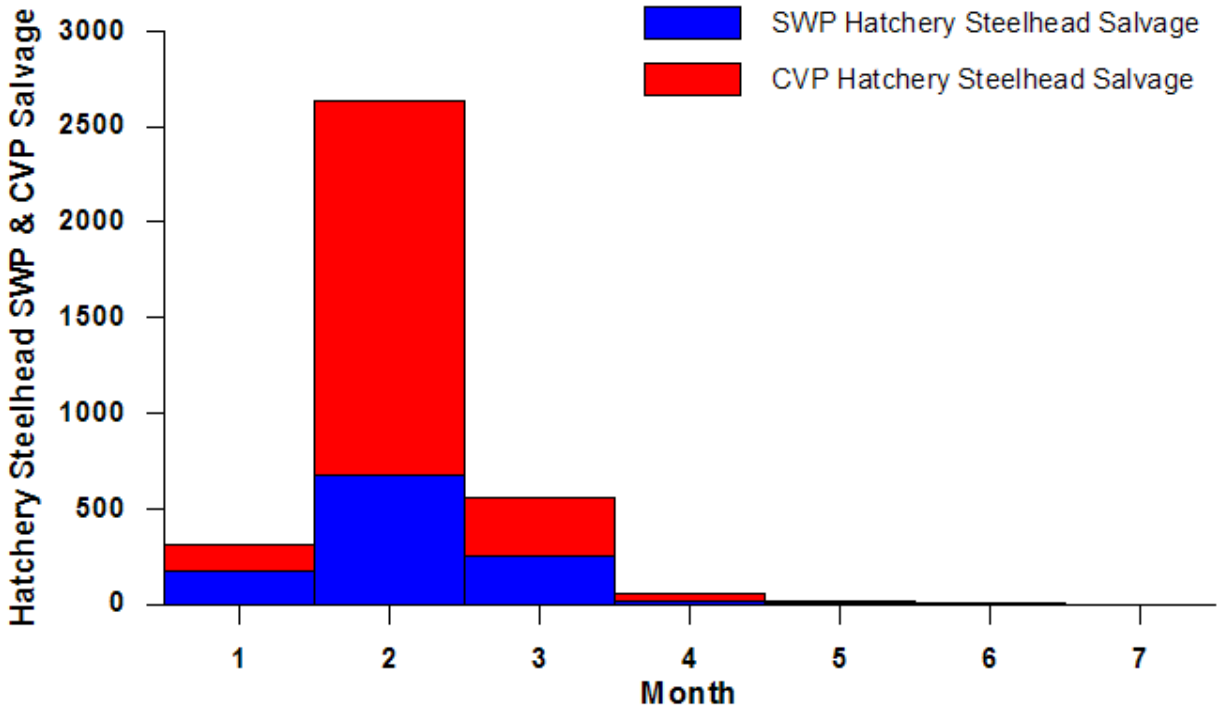

Figure 9. Juvenile hatchery steelhead salvage at the Delta Fish Facilities, October 2009 through July 2010.

Chipps Island. The pattern of recoveries at Chipps Island for both the December and January release was similar to the pattern of loss at the Delta Fish Facilities (Figures 3 and 4).

Juvenile Chinook Monitoring

During the October to May period, the number of non-clipped older juvenile Chinook salmon caught in the Sacramento River trawl decreased between 2008/2009 and 2009/2010 and was the lowest catch in the last eight years (Figure 10). The number of non-clipped fry/smolts decreased from 2008/2009 and was also the lowest in the last eight years (Figure 11). In 2009/2010 the older juveniles and fry/smolts occurred early January through February coincident with the three pulses of flow. Smolts occurred again early April through mid-June, also coincident with an increase in flow (Figure 12).

The number of older juvenile Chinook salmon slightly decreased in the Chipps Island trawl compared to 2008/2009, but increased significantly from 2007/2008. Overall, in comparison to the last eight years, older juvenile catch at Chipps Island was low (Figure 10). The number of fry/smolts increased in the Chipps Island trawl compared to 2007/2008, but was relatively low compared to the last eight years (Figure 11). A few older juveniles occurred in December and January. However, most of the older juveniles occurred early-February through March, coincident with the Livingston Stone winter hatchery release. Most smolts occurred between April and June, coincident with the Coleman fall hatchery releases (Figure 13).

In 2009/2010 the number of older juvenile Chinook salmon caught in the beach seines in the lower Sacramento River and north Delta was higher than 2008/2009 (Figure 14). Catch frequency for 2009/2010 in the west Delta, and central Delta was similar to 2008/2009, but compared to the last eight years the 2009/2010 juvenile Chinook catch was low. The number of fry/smolt Chinook salmon caught in the beach seines was higher than last year for all locations except the west Delta (Figure 15). The 2009/2010 year had the highest catch for fry/smolt Chinook for the lower Sacramento River, but overall, catch was low compared to the last eight years. Figures 16 – 21 are illustrations of the length and frequency of the seine catches.

Juvenile Steelhead Monitoring

Steelhead length data not acquired yet.

Tributary Spring-run Chinook Monitoring

DFG conducted tributary spring-run Chinook monitoring on Mill and Deer creeks using rotary screw traps in 2009/2010. They set the Mill Creek trap on October 13, 2009 and the Deer Creek trap on November 6, 2009 when flows increased sufficiently to trap effectively. Figure 22 is an illustration of the frequency and annual distribution of the

older juvenile catch on Mill and Deer creeks, and Figure 23 is an illustration of the frequency and distribution of the fry/smolt catch on Mill and Deer creeks.

Delta Hydrology

The 2009/2010 season was wetter than the past three years in both the Sacramento and San Joaquin basins (Figure 24). The 2010 water year type for the Sacramento basin was below normal. The San Joaquin basin was above normal. Table 2 is a summary of the average monthly State and federal exports both in acre feet and cubic feet per second, the average monthly Sacramento and San Joaquin River flows, delta outflow, and western delta flows.

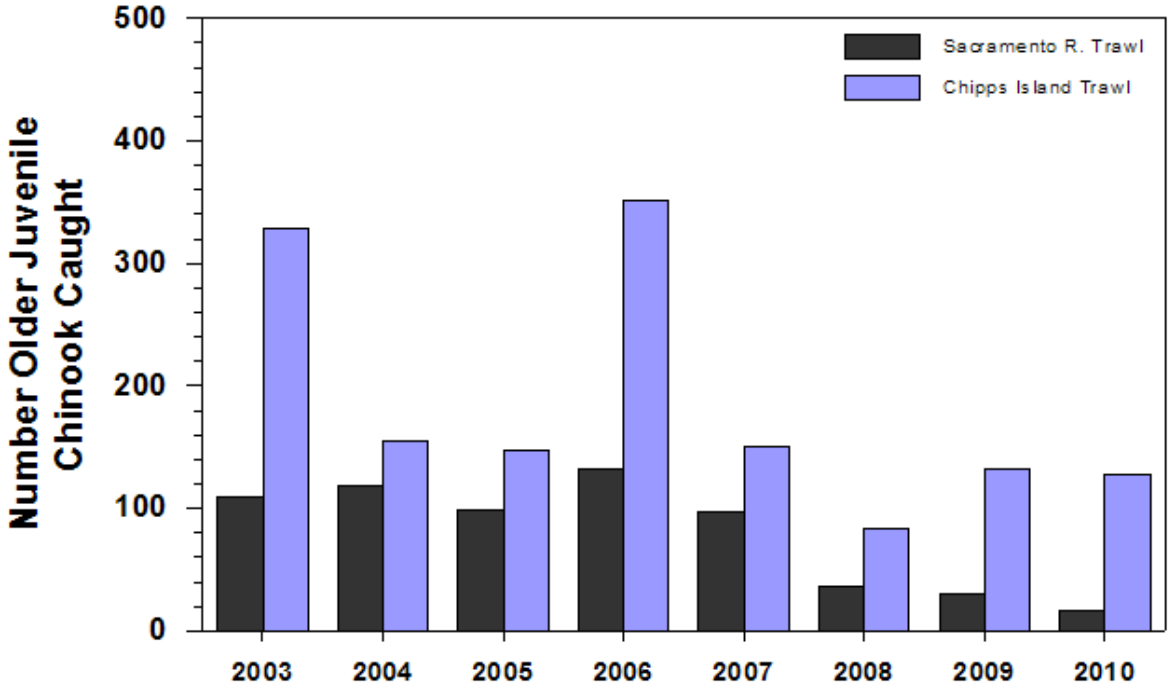

Figure 10. Number of non-clipped older juvenile Chinook caught in the Sacramento River and Chipps Island trawls, water years 2003 through 2010.

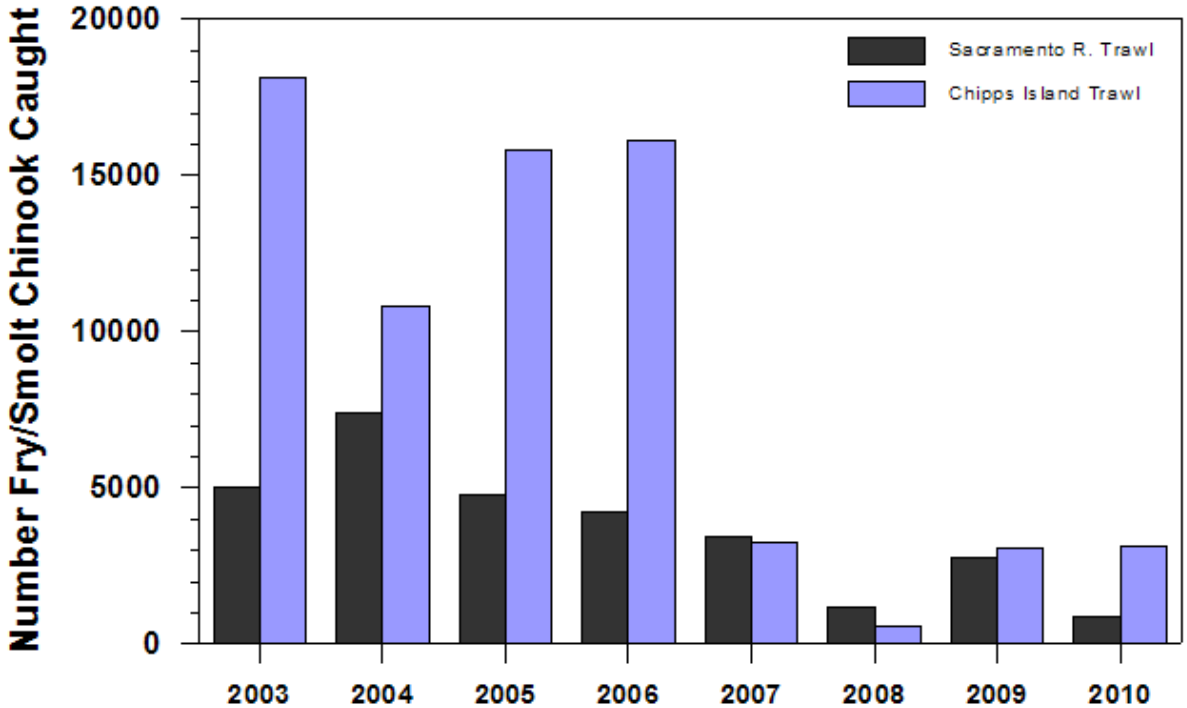

Figure 11. Number of non-clipped fry/smolts caught in the Sacramento River and Chipps Island trawls, water years 2003-2010.

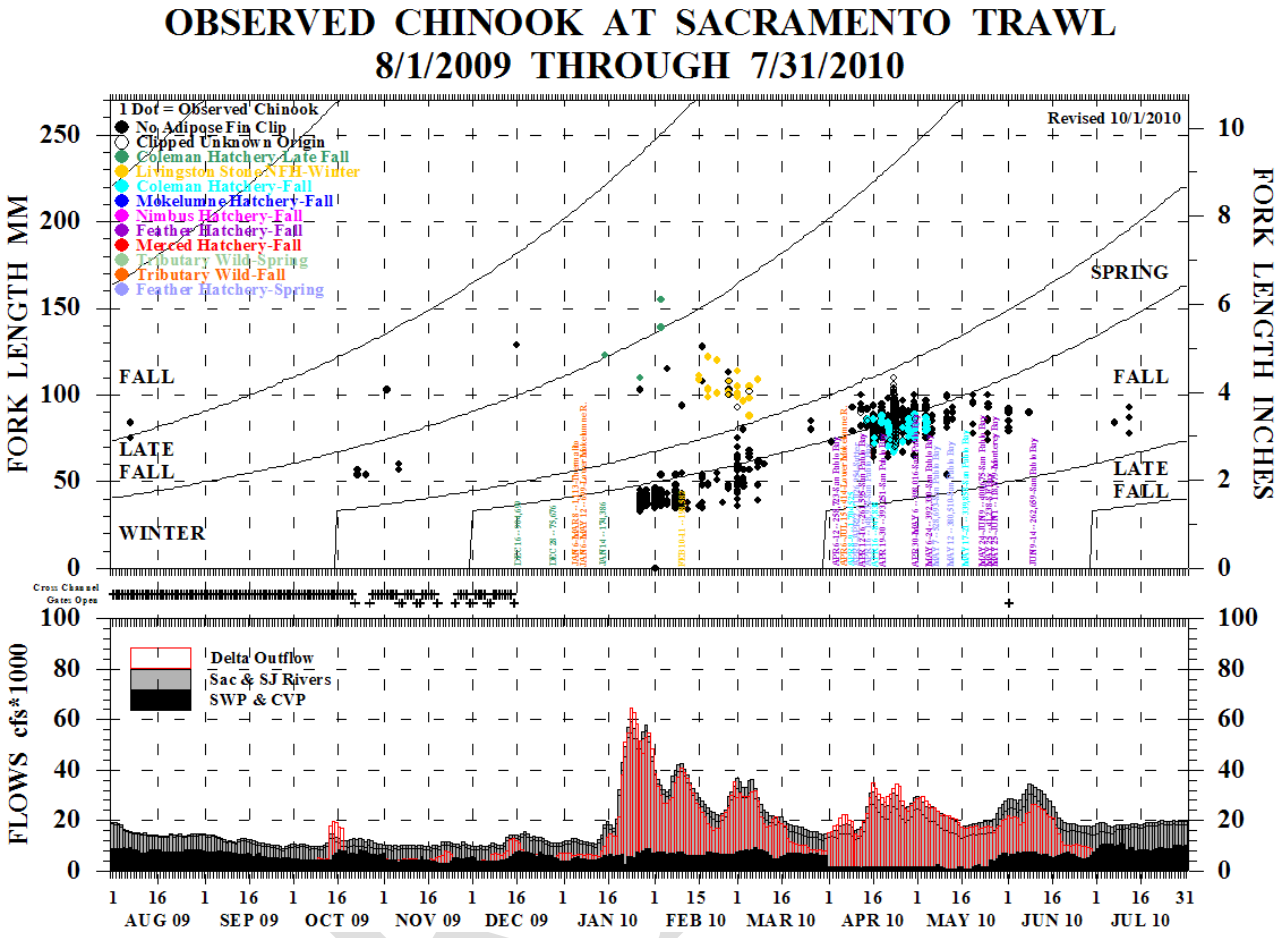

Figure 12. Juvenile Chinook caught in the Sacramento River trawl, August 2009 through July 2010.

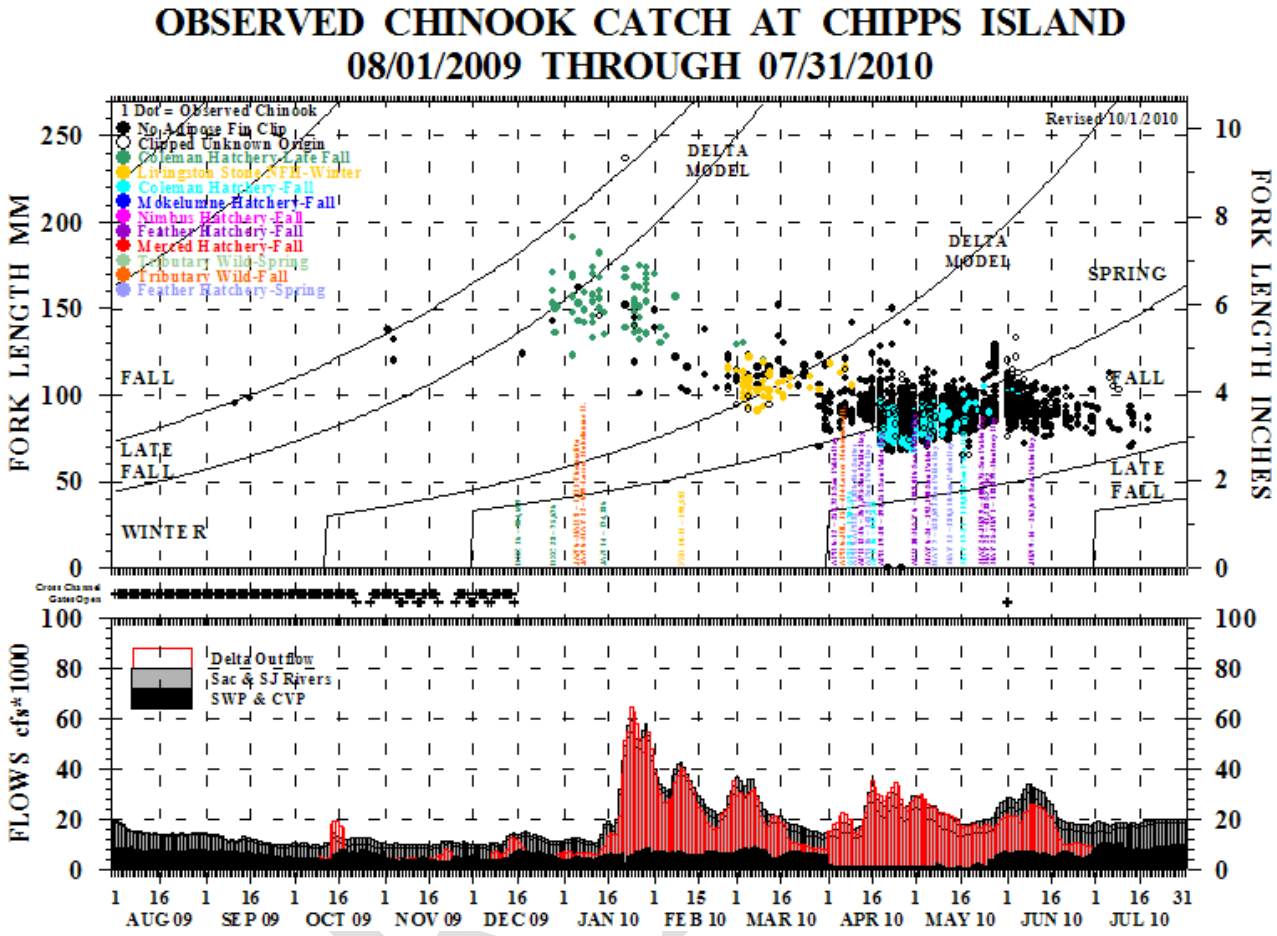

Figure 13. Juvenile Chinook caught in the Chipps Island trawl, August 2009 through July 2010.

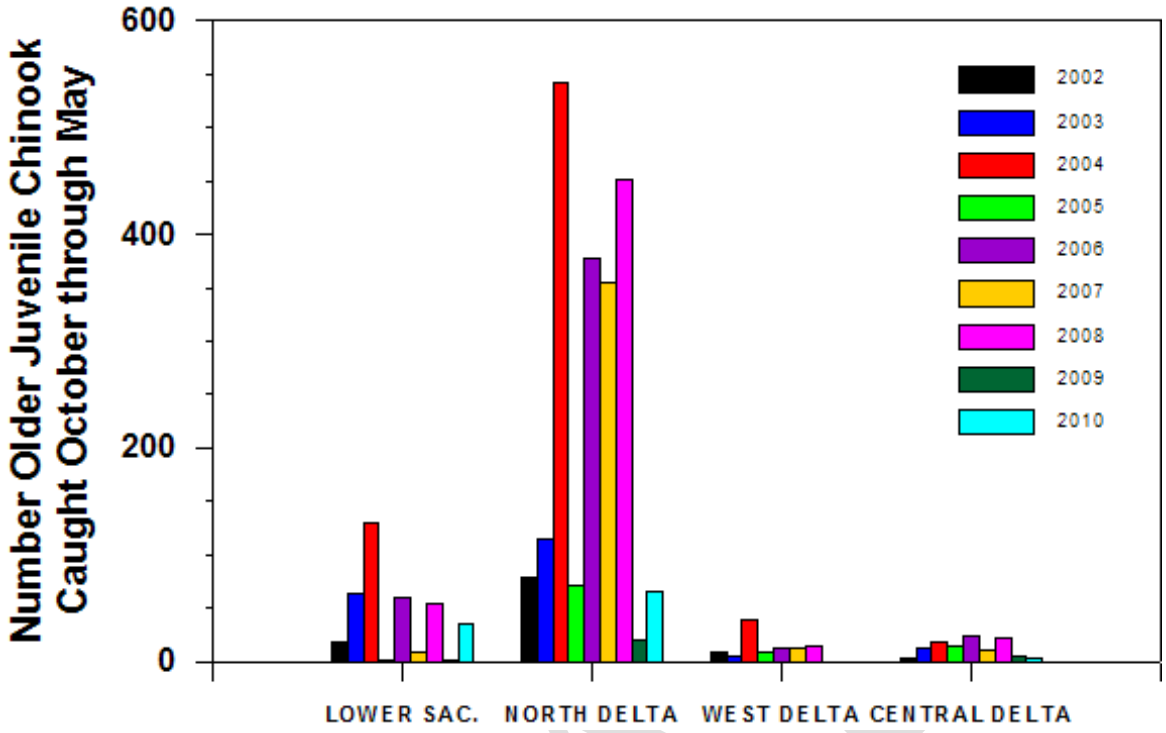

Figure 14. Number of older juvenile Chinook caught in the Sacramento-San Joaquin seines, water years 2002 through 2010.

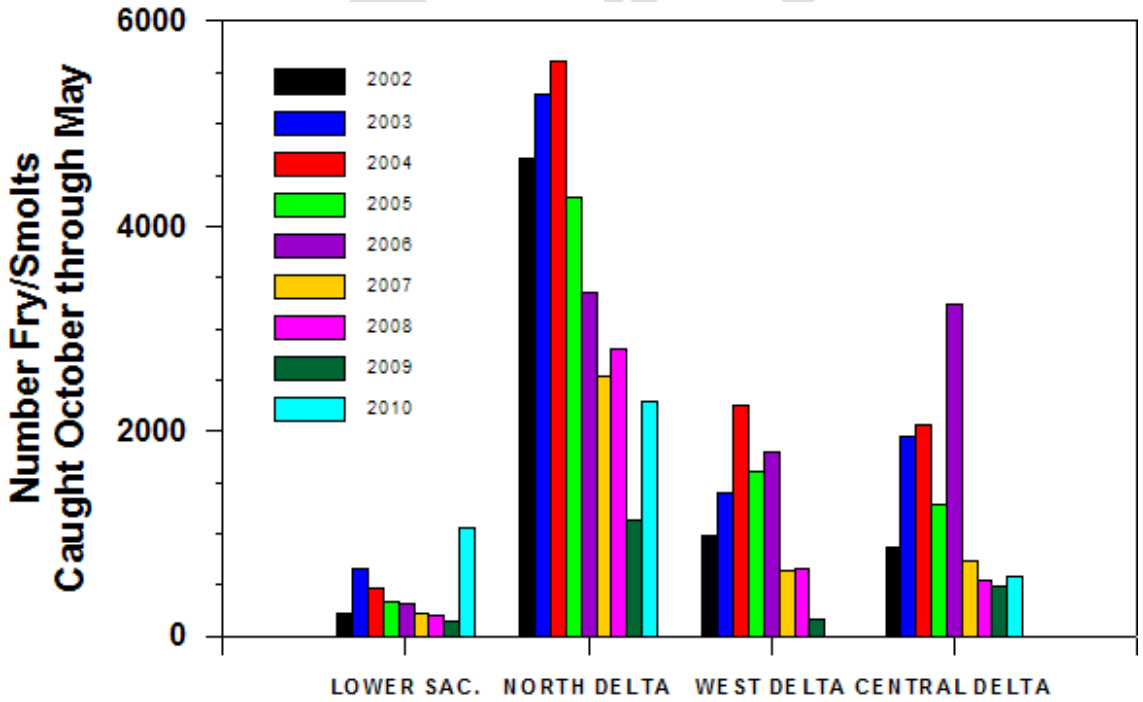

Figure 15. Number fry/smolt Chinook caught in the Sacramento-San Joaquin beach seines, water years 2002 through 2010.

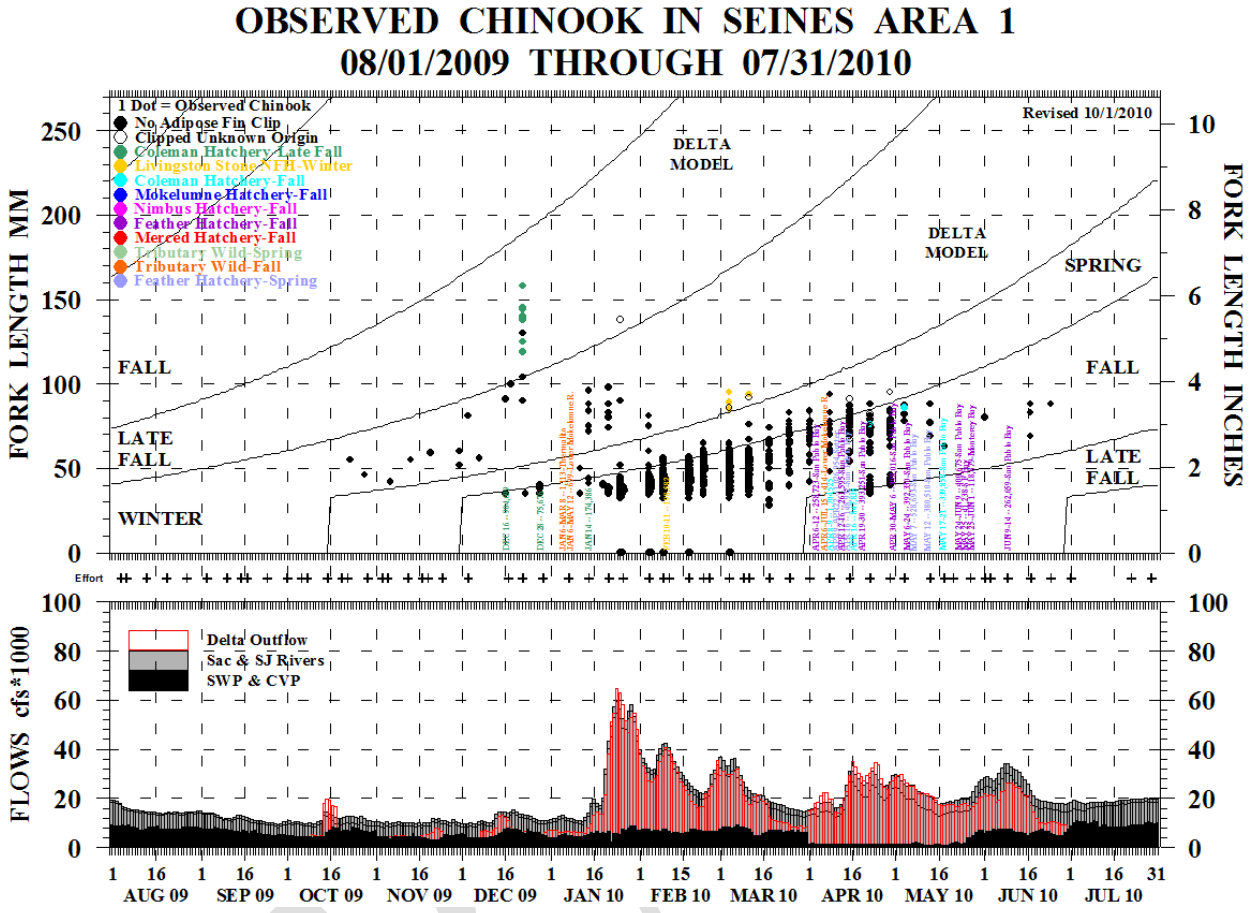

Figure 16. Juvenile Chinook caught in the lower Sacramento River beach seines, August 2009 through July 2010.

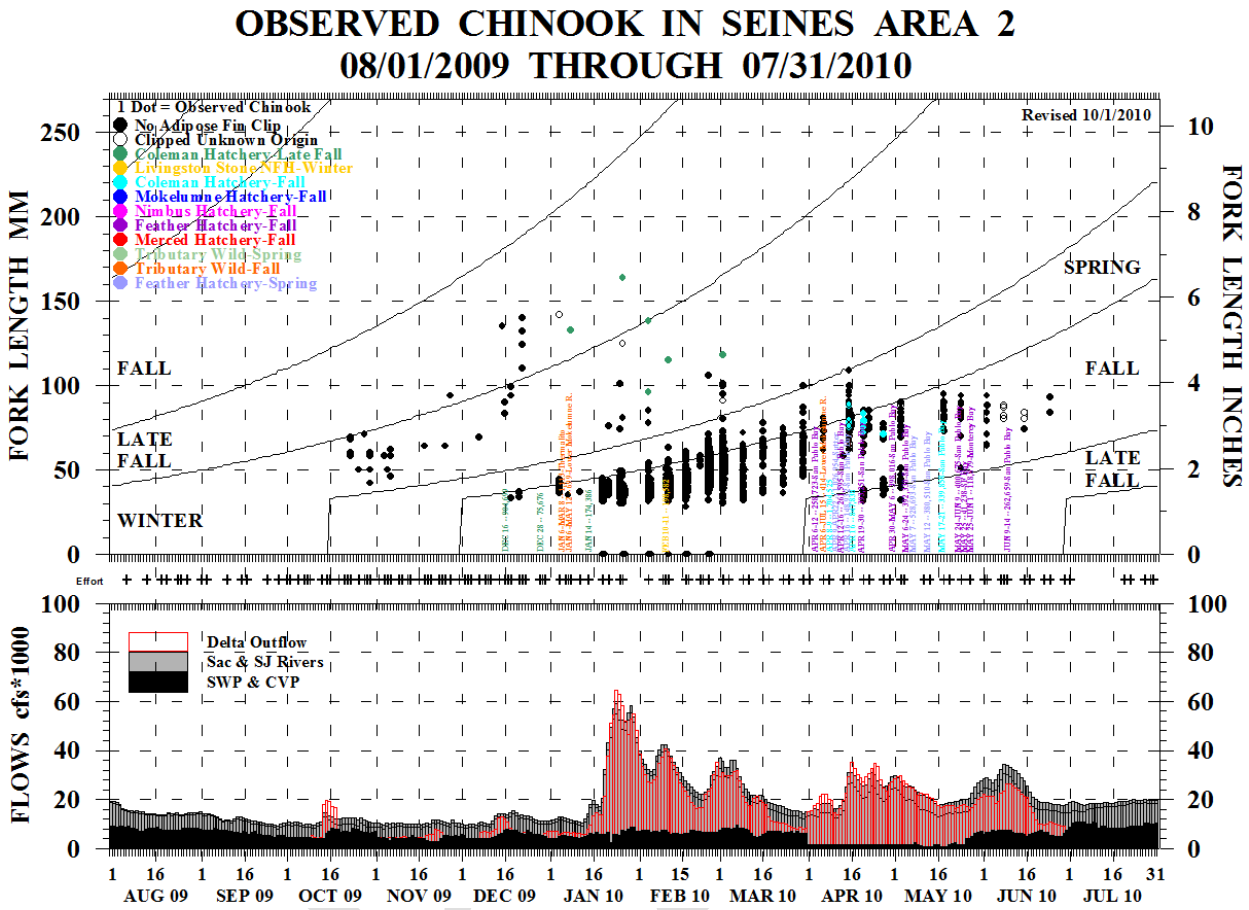

Figure 17. Juvenile Chinook caught in the North Delta beach seines, August 2009 through July 2010.

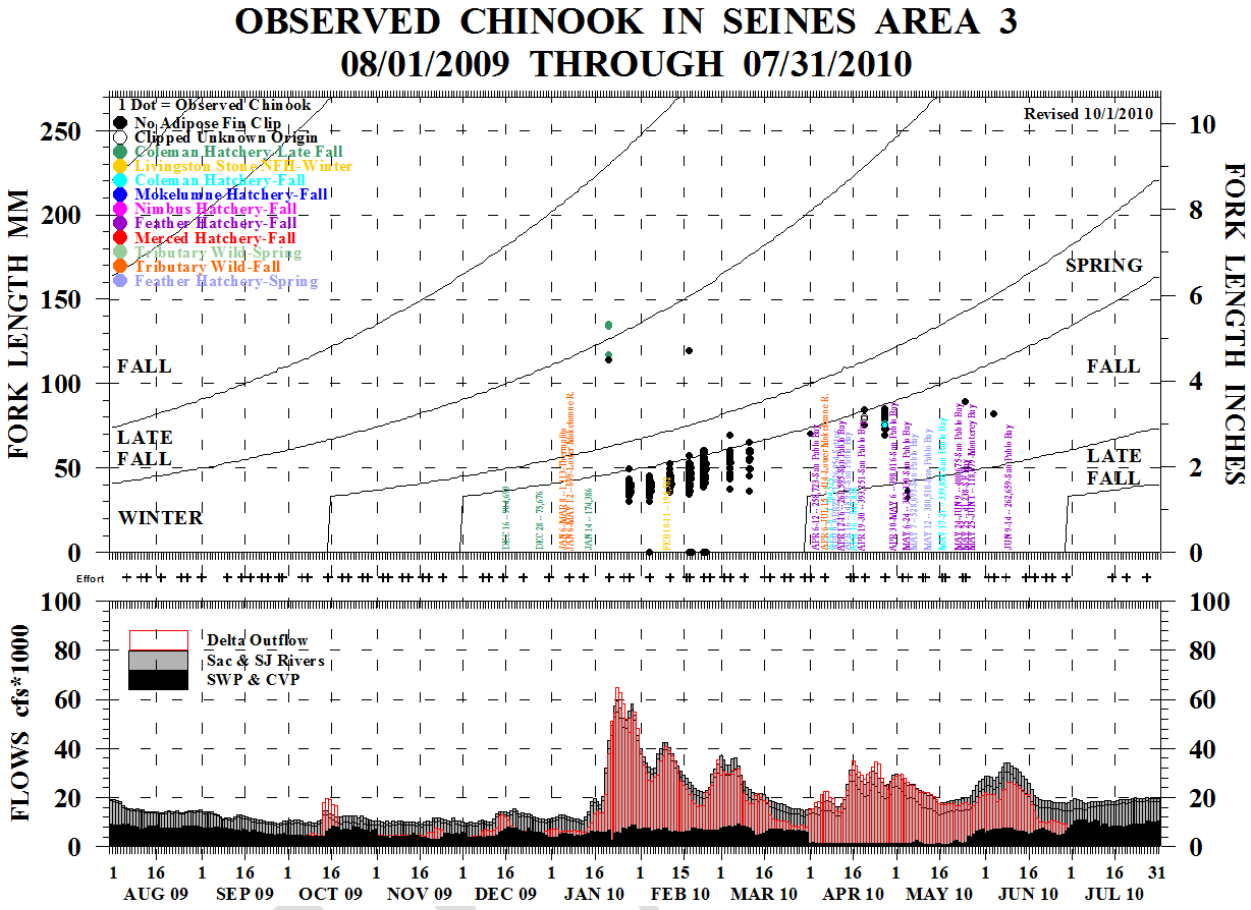

Figure 18. Juvenile Chinook caught in the Central Delta beach seines, August 2009 through July 2010.

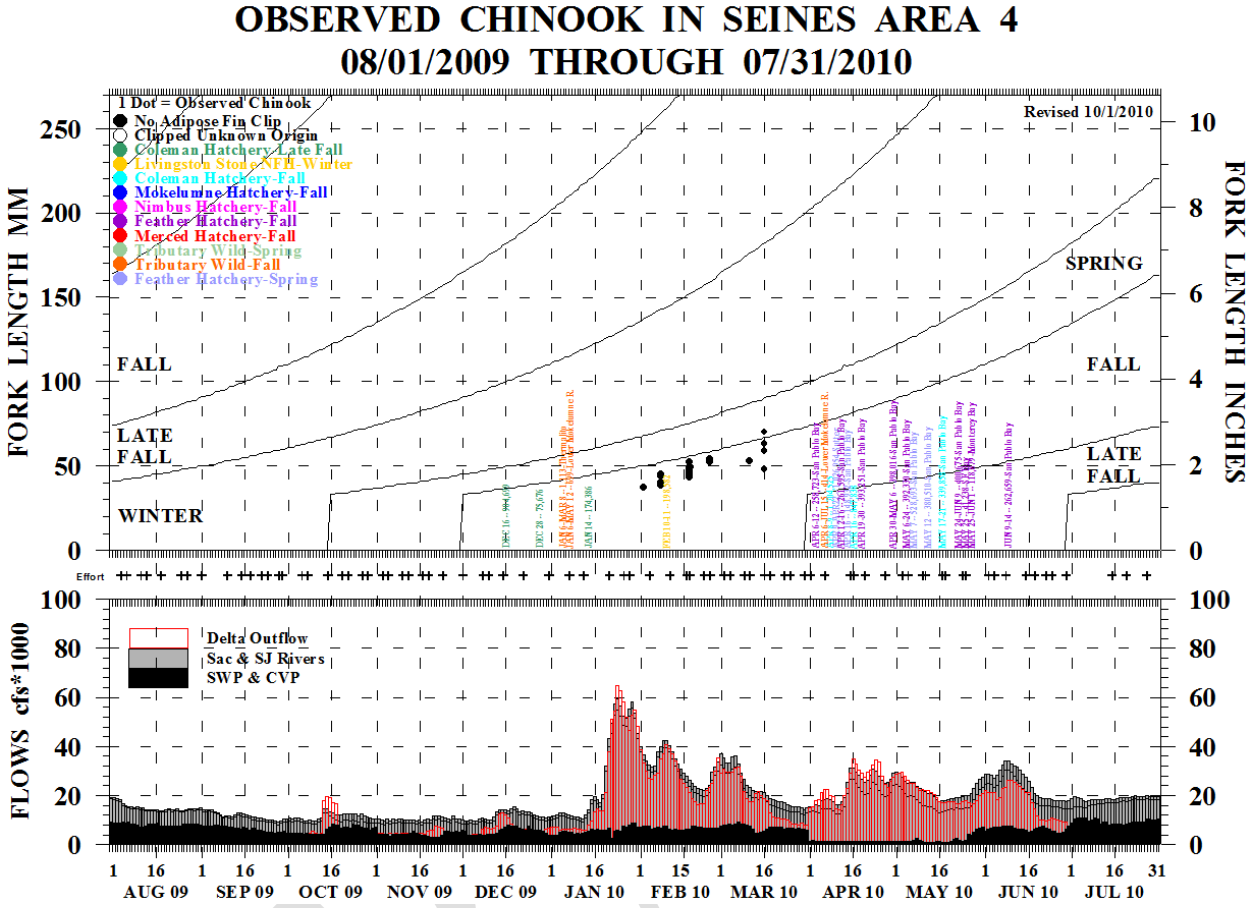

Figure 19. Juvenile Chinook caught in the South Delta beach seines, August 2009 through July 2010.

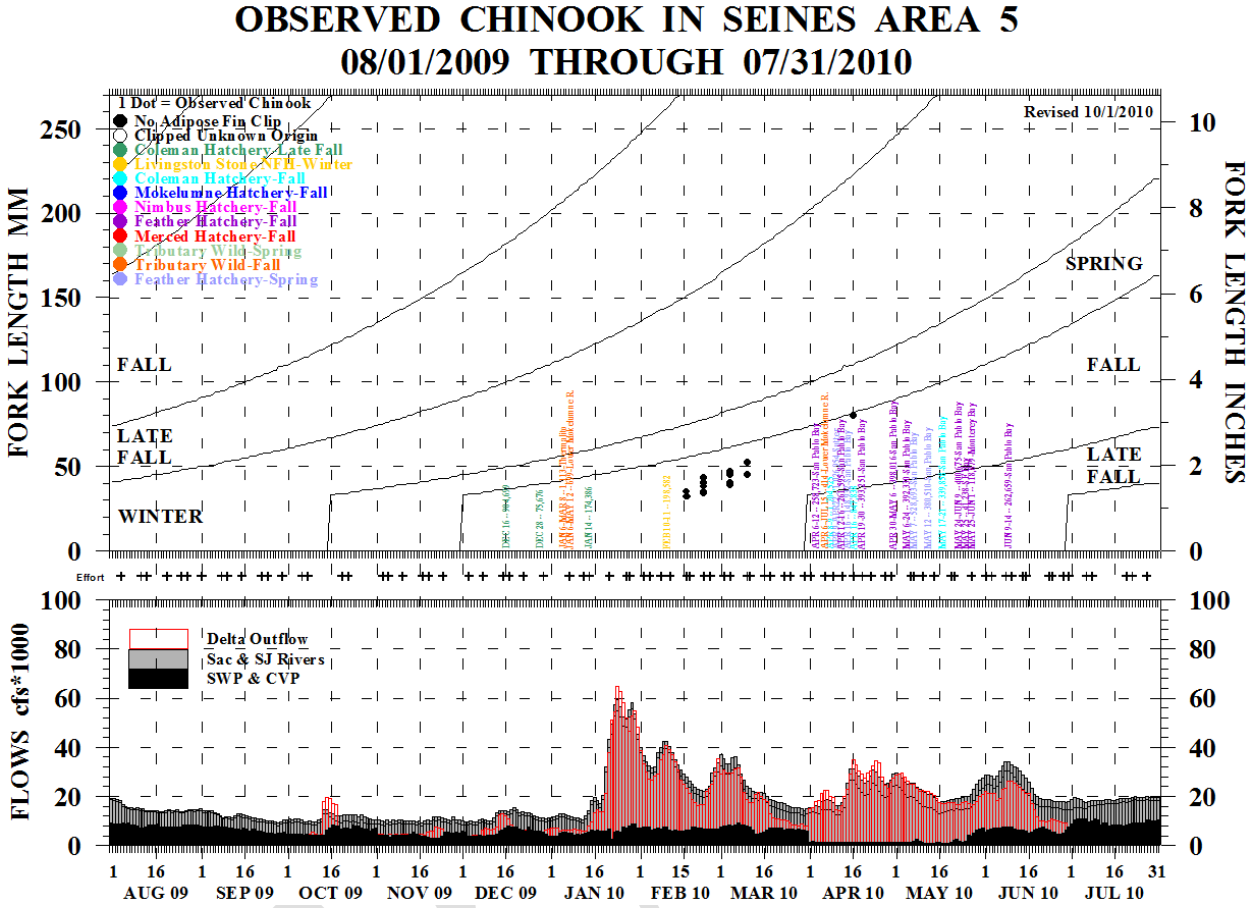

Figure 20. Juvenile Chinook caught in the San Joaquin beach seines, August 2009 through July 2010.

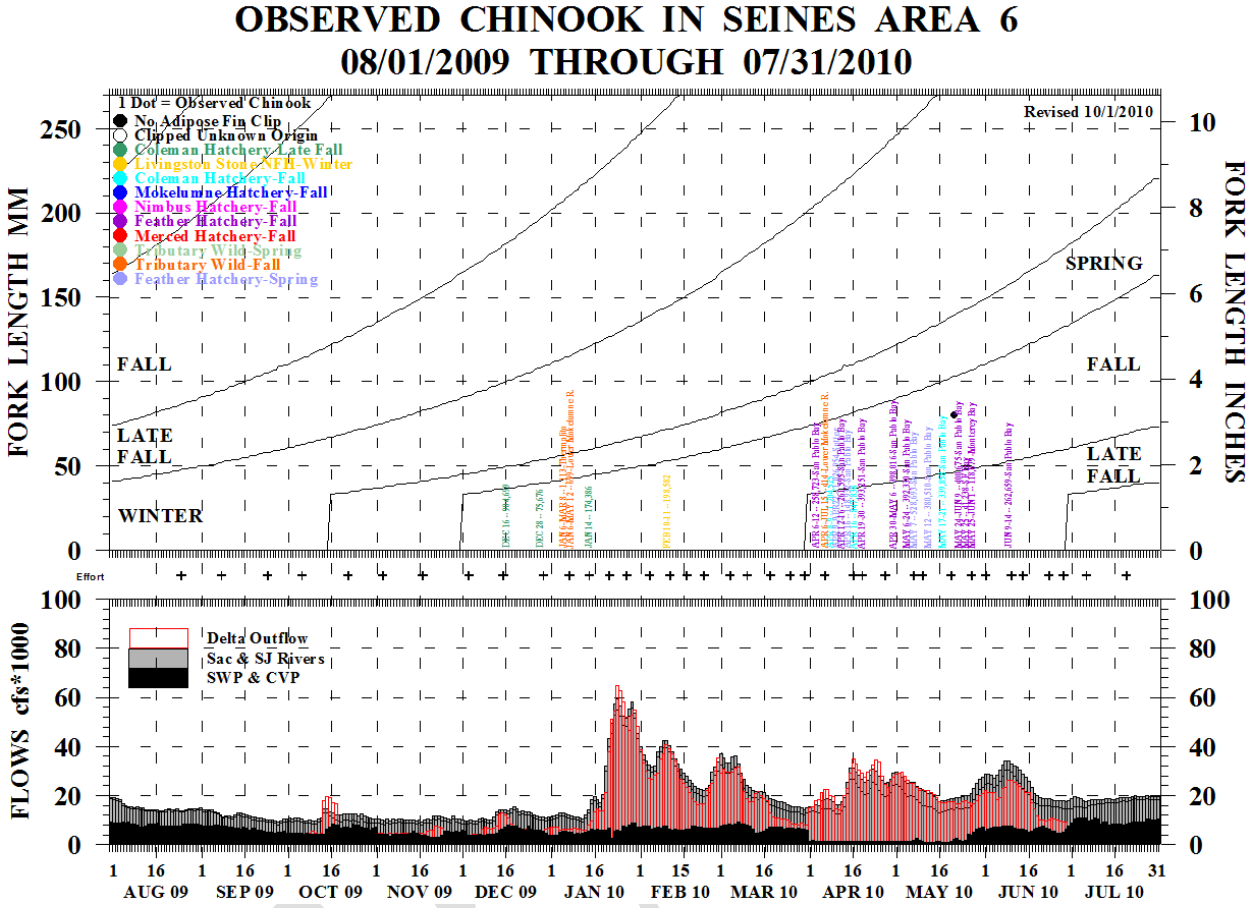

Figure 21. Juvenile Chinook caught in the Bay beach seines, August 2009 through July 2010.

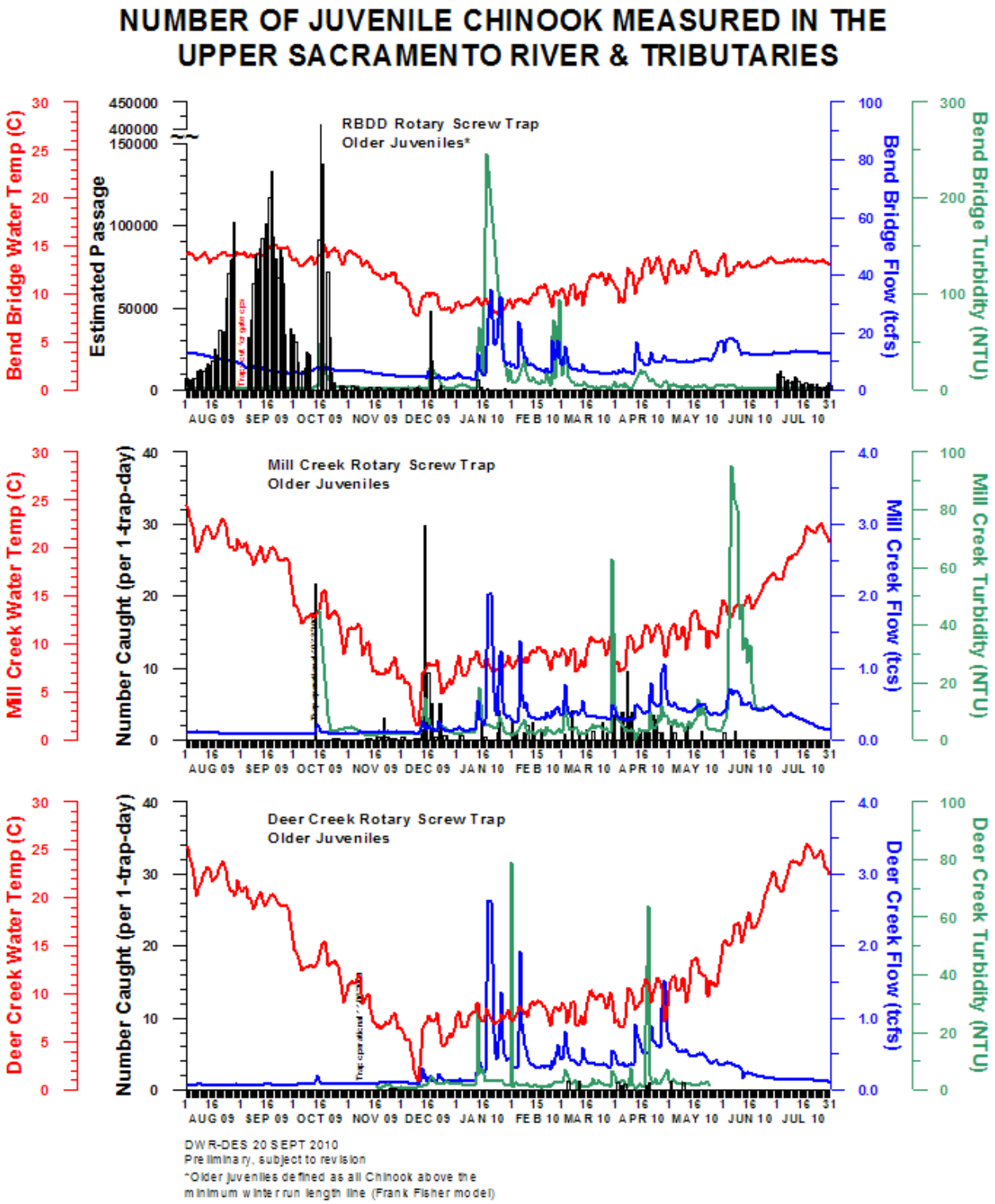

Figure 22. Number of older juvenile Chinook caught in the Mill and Deer creeks rotary screw trap, August 2009 through July 2010.

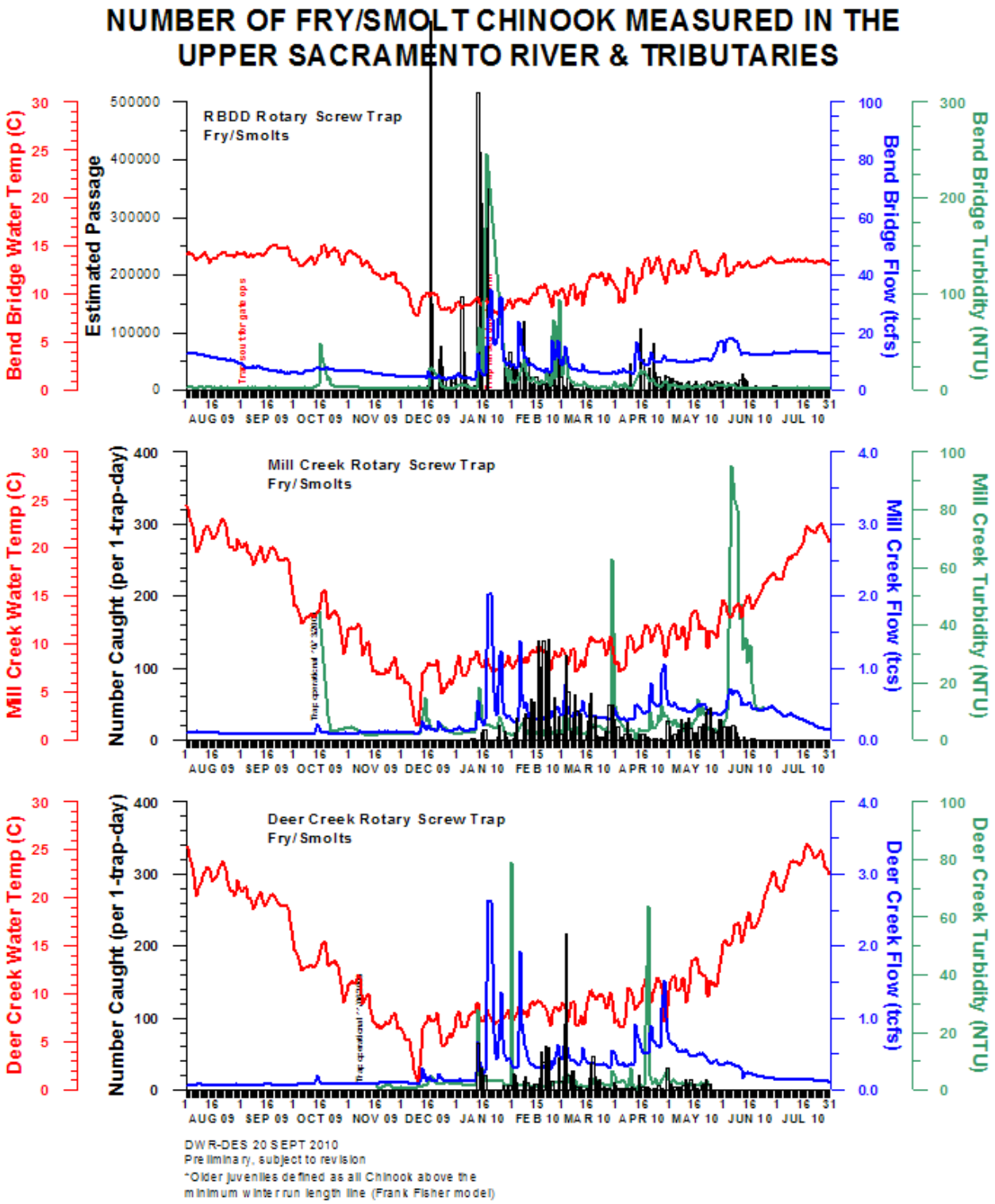

Figure 23. Number of fry/smolt Chinook caught in the Mill and Deer creeks rotary screw traps, August 2009 through July 2010.

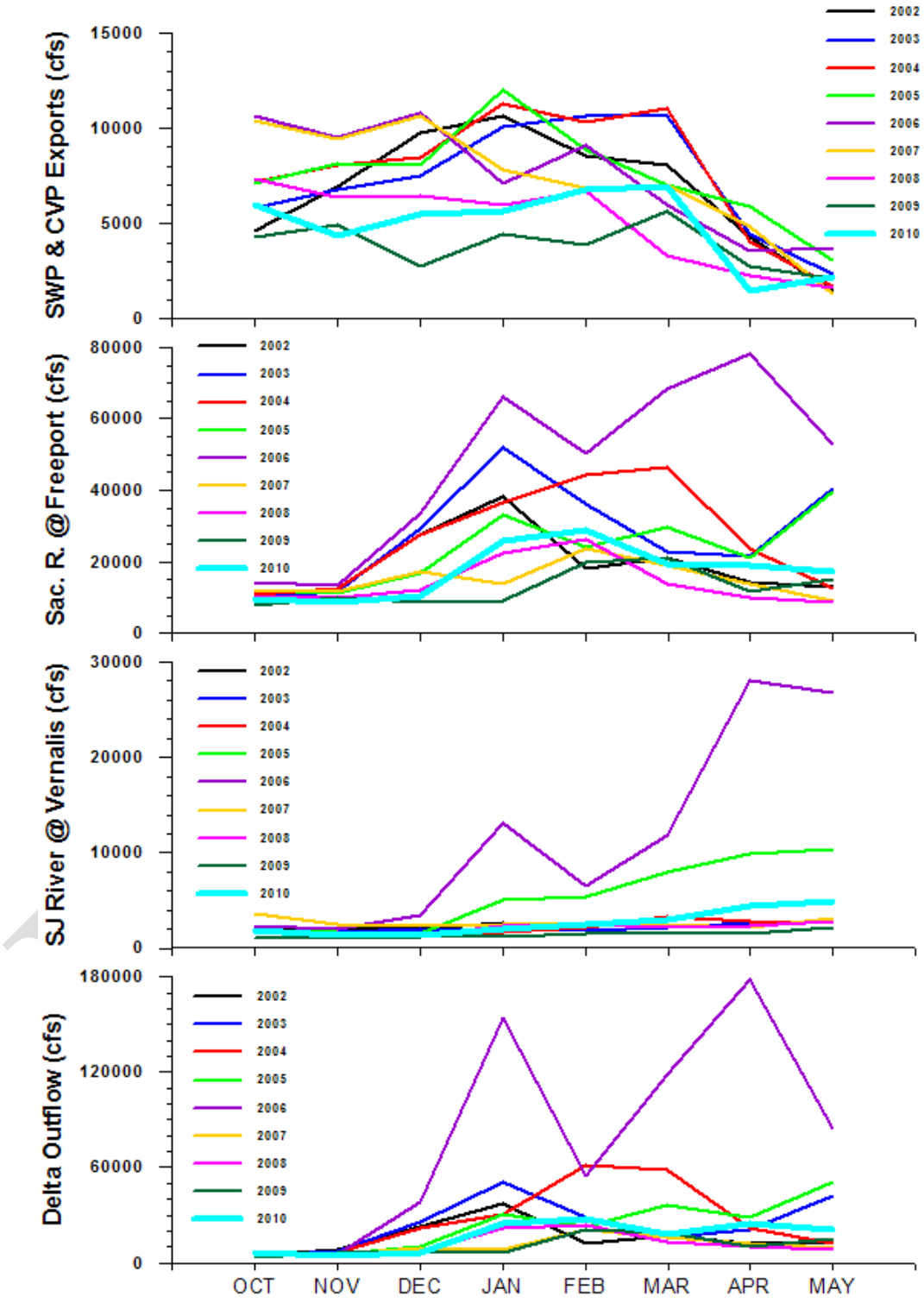

Figure 24. Monthly average Delta hydrology, water years 2002 through 2010.

Table 2. Monthly average Delta hydrologic parameters in the Sacramento-San Joaquin River Delta, October 2009 through May 2010.

MONTH	SWP AVERAGE EXPORTS AF	SWP AVERAGE EXPORTS CFS	CVP AVERAGE EXPORTS AF	CVP AVERAGE EXPORTS CFS	SACRAMENTO R. AVERAGE FLOW CFS	SAN JOAQUIN R. AVERAGE FLOW CFS	DELTA OUTFLOW AVERAGE FLOW CFS	Q WEST AVERAGE FLOW CFS
OCTOBER	4039	2036	7833	3949	9688	1807	6170	896
NOVEMBER	2998	1512	5687	2867	8976	1357	4679	263
DECEMBER	6548	3301	4295	2166	10662	1316	6466	-656
JANUARY	8012	4039	3181	1604	26141	2066	24563	1817
FEBRUARY	6005	3028	7432	3747	29137	2533	28039	2055
MARCH	7246	3653	6592	3324	19704	2998	17707	444
APRIL	1358	685	1611	812	18843	4354	24434	7826
MAY	1932	974	2453	1237	17238	4889	20783	6850

APPENDIX B

Delta Operations for Salmonids and Sturgeon (DOSS) Group

03/11/10 Thurs conf. call 2:00 pm

Objective: Provide advice to the Water Operations Management Team (WOMT) and National Marine Fisheries Service (NMFS) on measures to reduce adverse effects from Delta operations of the Central Valley Project and the State Water Project to salmonids and green sturgeon. DOSS will coordinate the work of other technical teams. DOSS notes and advice can be found at: http://swr.nmfs.noaa.gov/ocap/actions.htm

Attendees: Mike Ford, Carol Stroble, Sheila Greene, John Leahigh, Andy Chu, Tracy Pettit (DWR); Roger Guinee, Craig Anderson, Nick Hindman (FWS); Bruce Herbold (EPA), Barbara Byrne, Garwin Yip, Jeff Stuart, Bruce Oppenheim (NMFS); Paul Fujitani, Thuy Washburn (USBR); Greg Wilson (SWRCB); Dan Kratville (CDFG)

Agenda: Discuss NMFS' reasonable and prudent alternative (RPA) Action IV.2.3, and determine whether an Old and Middle River (OMR) flow trigger was met on Monday, March 8.

Because not all call participants had attended the DOSS meeting on Tuesday morning, March 9th, or the WOMT meeting on Tuesday afternoon, March 9th, NMFS provided a brief review of the discussions at those meetings.

DOSS meeting summary from March 9th:

The DOSS group discussed the second trigger in the table describing implementation of Action IV.2.3 (NMFS Opinion page 649) and noted that, as written, it advised operations not intended by the RPA. NMFS noted that a more meaningful implementation of the second trigger could be achieved using a modified trigger that would trigger a shift to OMR flows no more negative than -3500 cfs when combined loss density [fish/thousand acre feet (TAF)] exceeded 8 fish/TAF, and a shift to OMR flows no more negative than -2500 cfs when combined loss density exceeded 12 fish/TAF. DOSS supported this proposed trigger.

DOSS then reviewed monitoring data through Sunday (all that was available at the time of the DOSS call) and, using the modified second trigger, concluded that (because no triggers were met) the advice to WOMT was to continue operating so that OMR flows are no more negative than -5000 cfs. Because salvage numbers were observed to be getting higher (combined loss densities greater than 5 fish/TAF were observed on two days), and because March is typically the peak month of winter-run Chinook salmon salvage, DOSS also advised that the daily salvage be monitored closely on a daily basis so that action could be taken in a timely manner, if necessary. In this discussion, it was also noted that the higher salvage numbers were likely linked to the recent storm flows, and that since the flows were going down, it was possible that salvage might also taper off.

WOMT meeting summary:

NMFS reported on the morning's DOSS meeting, providing the advice and noting the points summarized above. WOMT agreed to the following notification procedure if daily combined loss density exceeded a trigger that would advise a change in operations:

1. NMFS sends a formal notification of the trigger being met (and the recommended action) to both the DOSS and WOMT e-mail distribution lists.
2. Project operators, per the transition procedures in the NMFS RPA (page 649), begin operating to the less negative OMR flows within two full days of the formal NMFS notification.
3. DOSS and WOMT, at their discretion, may call a meeting to discuss the triggering data or transition procedure.

New discussion

The group then moved on to a discussion of the second trigger. The second trigger, as written in the RPA (first and second stage triggers are met when loss>measured fish density/12 TAF and when loss>measured fish density/8 TAF, respectively), was modeled after a trigger used in the 2007 Chinook Salmon Decision Tree (same formula, applied to a overlapping, but different time of the year). The Chinook Decision Tree included in the OCAP BA (Appendix B) uses a similar trigger using a slightly different formula (first and second stage triggers are met when loss>measured fish density*12 TAF loss>measured fish density*8 TAF). These triggers will be referred to hereafter as the "division-based second trigger" and the "multiplication-based second trigger".

The group then briefly reviewed the behavior of the triggers and their responsiveness to loss densities at the facilities:

- Divison-based second trigger – This trigger is always exceeded, at both first and second stages, with *any* take at the pumps, which does not provide the sort of tiered protection (increased protection at higher loss densities) intended by this RPA action.
- Multiplication-based second trigger – This trigger is exceeded any time actual total exports (in TAF) exceeds 12 TAF (for the first stage trigger) or 8 TAF (for the second stage trigger), *independent* of loss. This trigger, like the division-based trigger, does not provide the tiered protection intended by this RPA action.

In contrast, a trigger that is met when combined loss density exceeds some "warning level" loss density is able to provide increased protection with increasing loss density and meet the intent of this RPA action. The "modified trigger" discussed would have triggered the first stage action if combined loss density exceeded 8 fish/TAF and the second stage action if combined loss density exceeded 12 fish/TAF.

Because the second trigger, as written in the NMFS RPA, has its basis in the Chinook Decision Tree, much of the call discussed the development of that trigger in the Chinook Decision Tree. It was noted that earlier (pre-2007) Chinook Decision trees did not include any form of the second trigger, and that just two Chinook triggers were used from mid-February onward:

(1) a trigger for winter-run that triggered an action if loss exceeded a criterion based on the current year's winter-run juvenile production estimate (JPE), and
(2) a trigger for spring-run that triggered an action if the percent loss of any spring-run surrogate release exceeded 0.5%.

The Chinook Decision Tree (both in 2007 and earlier) did use triggers very similar to the modified second trigger (*i.e.*, action was triggered if combined loss density exceeded some fixed "warning" loss density), with two differences. First, the Chinook Decision Tree used those types

of triggers during the October 1-February 15 period, and then switched to the triggers described immediately above. Second, the "warning" densities were set at 8 fish/TAF and 15 fish/TAF (compared to the 8 fish/TAF and 12 fish/TAF of the modified trigger).

While the group was able to review the triggers used in past Chinook Decision Trees, we did not have sufficient information to fully reconstruct the development of those triggers. The intent of the OMR actions in the RPA (similar to the export reduction actions in the Chinook Decision Tree) was to provide tiered protection based on the real-time monitoring of salvage at the fish facilities. Further review of materials used in the development of the Chinook Decision Tree (or a new review of relevant materials) would help to ensure that the second trigger is modified in a way that provides the intended protection to listed species, and that it would have associated biological rationale.

After a review and discussion of the various triggers, the group identified three options to move forward and identified the pros and cons of each (provided in the background section of the DOSS advice, below). After discussion of the three options, there was group consensus on the following DOSS advice.

DOSS advice to NMFS and WOMT from the March 11, 2010, DOSS call

Background:
Given the questions regarding the second salmon trigger within NMFS RPA Action IV.2.3 (*i.e.*, daily loss is greater than daily measured fish density divided by 12 taf), DOSS identified 3 options to move forward, along with pros and cons of each:

(1) implement the second trigger as written.
- Pro: Implementing the RPA as written.
- Con: The second trigger, as written, does not meet the intent of the action, which is to be responsive to increasing densities of fish at or near the pumps. As written, any take at either salvage facility would trigger an OMR action.

(2) implement a modified second trigger as discussed during the March 9, 2010, DOSS and WOMT meetings, that is, the first and second stage triggers would be met if combined loss density of older juveniles exceeds 8 fish/thousand acre feet (TAF) and 12 fish/TAF, respectively.
- Pros: A. This modified trigger, as intended, would increase protection as fish density increases at or near the export facilities.
  B. This modified trigger provides greater protection than the first trigger based on the winter-run juvenile production estimate for 2009-10 (*i.e.*, first and second stage triggers of 11 and 22 fish/TAF, respectively[1]).
- Con: The biological rationale for the modified trigger has not been fully discussed. While the modified trigger is similar to loss density criteria used in the Chinook salmon decision, the exact triggering densities and time of year during which

[1] [1] Based on the official JPE, the first and second stage triggers are 12 and 24 fish/TAF. The trigger levels of 11 and 22 fish/TAF mentioned on the call were based on the preliminary JPE and are no longer current.

those triggers apply differ between the Chinook salmon decision process and the modified trigger.

(3) implement only the first and third triggers while DOSS evaluates the second trigger.

Pros: A. The first and third triggers are well documented and understood, while the second trigger, as written, would require operations not intended by the action.

B. The biological rationale for the modified trigger has not been fully discussed.

Con: Not implementing the second trigger would provide less protection.

Recent loss densities are provided below.

Date	Combined loss (# fish)	Combined exports[2] (TAF)	Combined loss density (fish/TAF)
March 8, 2010	145	16,568	8.75
March 9, 2010	13	16,350	0.80
March 10, 2010	19.72	15,420	1.28
March 11, 2010[3]	17.32	14,951	1.16

DOSS discussed the potential benefits of the JPE-based versus absolute loss density triggers. All acknowledged the value of the first trigger, which is scaled to the current JPE.

- Some felt that this was adequate to protect the juvenile population. The first take concern level this year is 11,796, and the reconsultation level is 23,592. The current combined loss at the facilities is ~1,200. Because the combined loss is low, DWR concluded that protection beyond trigger #1 (*i.e.*, fish density trigger based on winter-run JPE) is not necessary at this time.
- Others felt that an additional fish density trigger not tied to the JPE would provide important protection against sporadic episodes of high salvage events.

DOSS advice:

After discussing the three options, above, and their associated pros and cons, DOSS advises WOMT and NMFS to implement option 3. Because neither the first or third triggers have been met, the DOSS advice to WOMT and NMFS is for the CVP and SWP to operate such that OMR is no more negative than -5,000 cfs.

[2] http://www.usbr.gov/mp/cvo/vungvari/deltaop.pdf

[3] Data for March 11, 2010, were reported after the DOSS call, but DOSS suggested including the data, if available, to inform WOMT

NMFS' March 12, 2010, Determination based on the DOSS advice from March 11, 2010

NMFS RPA Action IV.2.3 (page 649) Old and Middle River (OMR) Flow Management
During the January 1-June 15 time period, the following action triggers (only discussing the First Stage Trigger) would warrant an OMR action:

"Daily SWP/CVP older juvenile loss density (fish per taf)

1) is greater than incidental take limit divided by 2000 (2 percent WR JPE ÷ 2000), with a minimum value of 2.5 fish per taf, or
2) daily loss is greater than daily measured fish density divided by 12 taf (daily measured fish density ÷ 12 taf) or
3) CNFH CWT LFR or LSNFH CWT WR cumulative loss greater than 0.5%, or
4) daily loss of wild steelhead (intact adipose fin) is greater than the daily measured fish density divided by 12 taf (daily measured fish density ÷ 12 taf)"

DOSS Advice[1]
The DOSS advice to WOMT and NMFS is to implement only the first and third triggers while DOSS evaluates the second trigger. Because neither the first or third triggers have been met, the DOSS advice to WOMT and NMFS is for the CVP and SWP to operate such that OMR is no more negative than -5,000 cfs.

NMFS Determination
Through internal discussions, and the DOSS conference calls on March 9 and 11, 2010, NMFS reviewed the second trigger, and has determined that it is not workable in its current form. If implemented as proposed in the OCAP biological assessment (appendix B, page B-2), the trigger would result in multiple flow reductions independent of fish numbers or densities, and are not timed to reduce the risk to species based on their presence in the area[2]. After review of the DOSS advice, including the background information and considerations leading up to that advice, NMFS accepts the advice from DOSS and determines that implementing the first and third triggers of Action IV.2.3 (page 649 of the NMFS Opinion) provides for operations consistent with the intent of this action and is sufficiently protective of older juvenile salmon at this time. As shown in the table of loss densities in the attached DOSS advice, loss densities have decreased substantially since March 9, 2010, and the considerable decrease in loss densities were considered during the DOSS calls.

NMFS, with advice from DOSS, will continue to monitor OMR based on the first and third triggers. In addition, NMFS requests that DOSS review the second trigger, including possible modifications, and report back to NMFS in 2 weeks.

Attachment

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[1] The DOSS advice, including background information and considerations leading to that advice, is provided as an attachment to this NMFS determination

[2] The OCAP Opinion, page 649, shows daily measured fish density ÷ 12 taf, whereas the calculation in the OCAP biological assessment (Appendix B) is daily measured fish density * 12 taf. To apply the RPA action as it reads, the resulting unit would be fish/TAF^2, which cannot be evaluated against fish density to determine if daily measured fish density has or has not exceeded the trigger. If NMFS made the correction to reflect multiplication ("*") rather than division ("÷") by 12 taf, then an OMR action would be triggered anytime combined CVP and SWP exports exceeds 12 taf per day, independent of daily loss or daily measured fish density.

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